YUKON RIVER SALMON SEASON REVIEW FOR 2000 AND TECHNICAL COMMITTEE REPORT

Prepared by

THE UNITED STATES/CANADA
YUKON RIVER JOINT TECHNICAL COMMITTEE

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1.0 INTRODUCTION

The fall meeting of the Yukon River Joint Technical Committee (JTC) was held in Anchorage on October 23-25, 2000. The agenda for the JTC meeting was to prepare the standard season summary report, including a review of the fisheries, stocks, and projects. This agenda was cleared with the chief negotiators, and the report is intended for the information of the negotiation delegations. Participants at the meeting included the following persons:

Canadian Department of Fisheries and Oceans (DFO)
- Sandy Johnston
- Lana Miller
- Pat Milligan

Alaska Department of Fish and Game (ADF&G)
- Gene Sandone
- Bonnie Borba
- Tom Vania
- Penny Crane
- Polly Wheeler
- Steve Parry
- Russ Holder
- Dan Bergstrom
- Ted Spencer
- Rich Chapel
- Tracy Lingnau

National Marine Fisheries Service (NMFS)
- John Eiler
- Dick Wilmont

Bering Sea Fishermen's Association (BFSA)
- Jude Henzler
- Chris Stark
- Karen Gillis

U.S. Fish and Wildlife Service (USFWS)
- Jeff Bromaghin
- Monty Millard
- Jeff Adams
- Dave Wiswar
- Tevis Underwood

U.S. Geological Survey (USGS)
Jim Finn

National Park Service
Fred Andersen

Yukon River Drainage Fishermen's Association (YRDFA)
Jill Kline

Association of Village Council Presidents (AVCP)
Jennifer Hooper

Attachment I provides the updated historical Yukon River salmon catch and escapement data set in graphic and tabular form. Note that the Alaska commercial catch information in Attachment I is in numbers of salmon. As in the past, salmon roe sales have been converted to the number of salmon estimated to have been caught to produce the reported weight of roe sold. Attachment II provides information on marine fisheries.

2.0 2000 COMMERCIAL FISHERY - ALASKA

Preliminary estimates of commercial sales totaled 15,142 salmon for the Alaskan portion of the Yukon River drainage in 2000 (Tables 1 and 2). Note that in Table 1, the Alaskan commercial harvest is expressed as the number of salmon sold in the round, pounds of salmon roe sold, and estimated harvest which includes the estimated number of salmon harvested to produce roe sold. No roe sales for chinook and summer chum salmon occurred during the 2000 season. Total sales of salmon in the round were composed of 8,518 chinook and 6,624 summer chum salmon. No commercial fishing was allowed during the 2000 fall chum season. The 2000 chinook salmon harvest was the lowest commercial harvest since 1937. The summer chum salmon harvest was the lowest since the inception of summer chum salmon directed fishing in 1967. The 2000 chinook salmon harvest was 91% below the recent 10-year average harvest of 97,231 chinook. The summer chum salmon harvest was 98% below the recent 10-year average harvest of 390,482 fish.

The 2000 Yukon River salmon runs continued to show a trend of very low productivity, particularly in view of good parent-year escapements. Changing climate and ocean conditions may be a factor affecting salmon survival.

A total of 562 permit holders participated in the chinook and summer chum salmon fishery during 2000 (Table 1), which was 26% below the recent 10-year-average and the lowest on record. These 562 permit holders all fished in the Lower Yukon Area in 2000, which was 15% below the recent 10-year average. No commercial openings were allowed in the Upper Yukon Area for the first time since statehood.

Yukon River fishermen in Alaska received an estimated $734,239 for their chinook salmon and summer chum salmon harvest in 2000, which is approximately 88% below the recent 10-year average of $6.2 million. The decrease in exvessel value was due to the poor chinook and summer chum salmon runs. Four buyer-processors operated in the Lower Yukon Area during the 2000 summer season.

Lower Yukon fishers received an estimated average price per pound of $4.57 for chinook salmon and $0.17 for summer chum salmon. The average price paid for chinook salmon in the Lower Yukon Area was well above the recent 10-year average of $2.82 per pound. Prices paid for summer chum salmon in the round continued to be low, as observed since 1995. The exvessel value of the Lower Yukon Area fishery of $734,239 is 86% below the recent 10-year average of $5.2 million. The average income for Lower Yukon Area fishers that participated in the 2000 fishery was $1,306.

Department and cooperative test fishing projects caught a total of 2,519 chinook salmon and 5,816 summer chum salmon. Of these, a total of 275 chinook salmon, 561 summer chum salmon in District 1, and 322 chinook, 87 summer chum salmon in Districts 2 and 3 were sold in 2000. The fish sold are not included in the commercial totals referenced above. Salmon caught in test fishing projects are typically sold only during commercial openings. Healthy fish

(505 chinook salmon and 226 summer chum salmon) were released alive and dead fish not sold were given away to local residents. There were no test fish sales for the fall season.

2.1 Chinook and Summer Chum Salmon

The commercial harvest of chinook salmon was well below the low end of the guideline harvest range (GHR) for all districts and subdistricts (Table 3). The commercial fishery was managed conservatively by reducing the length of fishing period duration. The summer chum harvest was taken entirely as incidental bycatch to fishing directed at chinook salmon. No commercial openings were allowed in Districts 3 – 6.

The 2000 Yukon River chinook and summer chum salmon runs continued to exhibit the decline in productivity observed in recent years. Five and six-year-old chinook salmon abundance was much less than would be expected, based on parent-year escapements. Although parent-year escapements were very good from 1994 through 1996, summer chum salmon abundance has been below average to poor since 1997. An extreme flood event in the Koyukuk River drainage in August 1994 and low snow cover during the winter of 1995-96 may account for some of the decline in chum salmon abundance. However, changing climate and ocean conditions are suspected to have also impacted salmon survival.

The 2000 preseason outlook was for weak to below average chinook and summer chum salmon runs that would only support subsistence needs and a limited commercial harvest of 25,000 to 65,000 chinook (23,000 to 60,000 fish in the Lower Yukon Area and 2,000 to 5,000 fish in the Upper Yukon Area) and 25,000 to 300,000 summer chum salmon in the Alaskan portion of the drainage. These expected harvest ranges were substantially below the GHR (Table 3). The return of 5-year-old chinook salmon was expected to be near average based on good spawning escapements in 1995 and the number of 4-year-old fish that returned in 1999. The return of 6-year-old chinook salmon was expected to be below average based on the number of 5-year-old fish that returned in 1999.

The ice went out of the river on May 29, about one week later than is normal in recent years. The first subsistence catch of chinook salmon was reported on June 3 near Emmonak. The department's test fishing projects recorded the first chinook salmon catches on June 4. River conditions throughout the early portion of the season were characterized by unusually high water with accompanying heavy debris loads.

Yukon River chinook salmon abundance in 2000 was assessed as very poor based on the commercial harvest and escapement counts and estimates from selected tributaries. Approximately 50% of the chinook salmon run had entered the lower river by June 25, five days later than average and several days earlier than 1998. The cumulative test fishing catch per unit effort (CPUE) in 2000 was 14.12 compared to the average of 25.14 for the 1989-1999 period. The Pilot Station sonar cumulative passage preliminary estimate of 69,000 chinook salmon (approximate 90% confidence interval range: 61,700 – 78,500) was below the passage estimates of 134,000 fish in 1998 and 188,000 fish in 1999. Further analysis of run assessment will be completed this winter.

The summer chum salmon run was assessed as being poor in abundance. According to test fish CPUE data, approximately 50% of the summer chum run entered the lower river by June 25, two days later than average. The Pilot Station sonar cumulative passage estimate through July 18 was 433,000 summer chum salmon (approximate 90% confidence interval range: 392,000 – 429,000). Passage estimates for summer chum salmon were 3.6 million in 1995, 1.4 million in 1997, 746,000 in 1998 and 939,000 in 1999. Nearly one million summer chum salmon are needed for spawning escapement throughout the drainage. No directed summer chum commercial harvest was possible this year, based on reported subsistence harvests, Pilot Station sonar passage estimates and escapement counts at the East Fork Andreafsky, Anvik, Nulato, Gisasa, Chena and Salcha rivers and Kaltag and Clear creeks.

Districts 1-3

The management strategy is to open the chinook salmon directed commercial fishery in the Lower Yukon Area when increasing subsistence and/or test net catches of chinook salmon have occurred over a seven- to ten-day period. The 2000 commercial fishing season opened on June 24 in District 1, which tied with the latest opening on record. The opening was allowed after approximately nine days of increasing subsistence and test fishery catches. Based on the lower river test fishery, the chinook migration increased rapidly from June 19 through June 22 and remained fairly steady through June 29. After June 29, the abundance of chinook salmon declined.

Management of the commercial fishery was conservative to keep harvests at the low end of the anticipated range of 23,000-60,000 chinook salmon. There were two commercial fishing periods allowed in District 1 and one period in District 2. Fishing periods in these districts were reduced to 6-hours from the more typical 12-hour periods. Unrestricted mesh size gillnets were allowed during all fishing periods in the Lower Yukon Area to direct the harvest at chinook salmon. Because of the poor run of summer chum salmon, this species was not commercially targeted and no six-inch maximum mesh size fishing periods were allowed.

The combined total harvest of 8,518 chinook salmon for Districts 1 and 2 was 86% below the low end of the District 1 and 2 GHR of 60,000 fish, 91% below the 1990-1999 average harvest of 89,939 fish and 63% below the low end of the preseason harvest expectation of 23,000 fish. The average weight of chinook salmon was 18.7 pounds.

The combined commercial summer chum salmon harvest in District 1 and 2 of 6,624 fish was 97% below the District 1 and 2 GHR of 251,000 fish, 96% below the recent 10-year average harvest of 155,022 fish and 74% below the low end of the preseason harvest expectation of 25,000 fish. The average weight of summer chum salmon was 7.7 pounds.

District 3 was not opened for commercial fishing in 2000. There was no commercial harvest of chinook salmon in District 3 from 1995 through 1998 because of a lack of markets. The recent 10-year average harvest is 966 fish.

Districts 4-6

Subdistrict 4-A and the Anvik River Management Area were not opened to commercial fishing for the third consecutive year because of poor runs of summer chum salmon. The Anvik River did not meet its minimum escapement goal of 500,000 summer chum salmon. The recent 10-year average harvest for Subdistrict 4-A and the Anvik River Management Area was 1,647 summer chum salmon in the round and 99,076 pounds of summer chum roe. From 1991-1999, exvessel value averaged $353,777. During 1991-1996, when summer chum salmon were more abundant, an average of 60 permit holders fished annually in this subdistrict.

Commercial fishing was not opened in Subdistricts 4-B and 4-C because of poor chinook and summer chum salmon runs. The recent 10-year average harvest was 1,680 chinook and an estimated 25,434 summer chum salmon.

Subdistricts 5-B and 5-C were not opened for commercial fishing in 2000. The 1990-1999 average harvest was 2,628 chinook and an estimated 245 summer chum salmon. Typically, the harvest of summer chum salmon is low in these subdistricts as they are located above the vast majority of summer chum spawning areas.

Commercial fishing in Subdistrict 5-D was not opened in 2000. The Subdistrict 5-D recent 10-year average harvest was 441 chinook and an estimated 17 summer chum salmon.

District 6, the Tanana River, was not opened for commercial fishing in 2000. The recent 10-year average total estimated commercial harvest is 1,561 chinook and 19,142 summer chum salmon. Management of the fishery is primarily based on Chena and Salcha river's tower counts.

2.2. Fall Chum and Coho Salmon Management, 2000

The 2000 Yukon River fall chum salmon run is managed according to guidelines established by the Alaska Board of Fisheries in 5 AAC 01.249. *Yukon River Drainage Fall Chum Salmon Management Plan*. The management plan provides for escapement needs and mandates subsistence use priority over commercial, sport and personal use fishing activities. The management plan stipulates that commercial fisheries that are directed at fall chum salmon be allowed only when the run size projection is greater than 675,000 fall chum salmon. At run sizes of less than 600,000 fall chum salmon, the drainage-wide escapement goal drops in increments from 400,000 to a minimum of 350,000 fish. Provisions in the plan allow for varying levels of subsistence salmon fishing restrictions prior to closure of the fishery, when necessary, to meet minimum escapement requirements.

From 1987 to 1998 the Yukon River preseason fall chum salmon projection has been presented as a point estimate. However, because of the unexpected run failures observed in 1998 and 1999, a high level of uncertainty was associated with the Yukon River fall chum salmon preseason run projection for 2000. Consequently, the 2000 Yukon River preseason projection was presented as a range of 530,000 to 1,100,000 fall chum salmon.

As a result of the wide range in the preseason projection, the department relied more heavily on inseason run assessment tools earlier in the run than usual, including information from the summer chum and chinook salmon runs earlier in the summer. The 2000 run was monitored in the lower Yukon River by using the lower Yukon River set gillnet test fishery, Mountain Village drift gillnet test fishery (operated by Asacarsarmiut Traditional Council), Pilot Station sonar passage estimates and subsistence catch reports. Results from these projects, in combination with the preseason projection, were the basis for the initial management decision to restrict the 2000 subsistence fishery for fall chum salmon.

The majority of fall chum salmon enter the Yukon River from mid-July through early September in erratic surges (pulses) which usually last two to three days. Typically, four or five such pulses occur each season. These pulses are often associated with on-shore wind events or high tides. This characteristic entry pattern makes it difficult to accurately assess the run strength, particularly early in the season.

The 2000 fall chum salmon run showed some strength in the earlier portion of the run but was followed by extremely weak pulses. A small pulse of chum salmon migrated through the lower Yukon River on July 15 and 16, the dates the test set gillnets were switched from summer to fall season salmon fishing gear. The first major pulse of fall chum salmon entered the Yukon River on July 24 and appeared to last six days. This pulse was detected by the Lower Yukon River test net project. In recent years, catch per unit effort (CPUE) of fall chum salmon in these test nets has grossly overestimated fall chum salmon run strength. Therefore, during 2000, the initial good run strength portrayed by this project was suspected to be inaccurate. Ultimately, based on other projects and upriver verification, the 2000 fall chum run strength was assessed as poor. The Lower Yukon test net CPUE data continued to grossly overestimate the run size throughout the season. There are some indications that the primary test gillnet sites have drastically changed from previous years and/or the extremes in water levels in recent years is contributing to the effect.

Based on the extreme weakness in the summer season salmon runs, the fall chum salmon run was re-evaluated and anticipated to be closer to the lower end of the preseason projection (530,000 fish). When applied to the Yukon River Fall chum salmon management plan, this run size would not support normal subsistence harvests and meet escapement requirements. Therefore, the restrictions remained in place into the fall fishing season while the fall chum salmon run was being assessed. For the first time in history, the entire Yukon River drainage began the fall fishing season under subsistence restrictions that were initially imposed because of the poor abundance of chinook and summer chum salmon. As of July 19, 2000, the subsistence restrictions were as follows: Districts 1, 2, and 3 were reduced to one 12-hour period per week; District 4 was reduced to two 24-hour periods per week; and District 5 was reduced to one 24-hour and two 12-hour periods per week. Subdistricts 6-A and 6-B on the Tanana River and the Upper Tanana River drainage were reduced to one 24-hour period per week, and the "Old Minto Area" was reduced to one 40-hour period per week.

After the initial pulse of fall chum salmon, a lull in fish passage rates lasting eleven days occurred through August 10, followed by extremely weak pulses into September. This continued poor performance of the run led to further restrictions to the subsistence fishery on August 12. Restrictions were as follows: Districts 1, 2, and 3 were reduced to one 6-hour period per week; Districts 4 and 5 were reduced to one 24-hour period per week. On the Tanana River, Subdistricts 6-A and 6-B were reduced to one 18-hour period per week, the "Old Minto Area" was reduced to one 24-hour period per week, and the Upper Tanana River drainage was placed on 36 hours per week. These restrictions reflected an 80% reduction of opportunity in all areas except for the Lower Yukon Area, which was reduced to approximately 96%.

Assessment of the fall chum salmon run in the upper Yukon River commenced with the Kaltag drift test fishery program (operated by the city of Kaltag). The majority of projects in the Upper Yukon Area confirmed a very weak and lower than expected fall chum salmon run. However, the Rapids/Rampart (Upper Yukon Area) tagging fish wheel CPUE was one exception. The extremely high water levels that were observed this season throughout the mainstem Yukon River, were believed to have attributed to the increased catch rates at the Rapids sites. We believe that the increased water volume, in conjunction with the higher velocity of the water through the canyon at this site, caused the fish to be more susceptible to fish wheel gear by forcing them closer to the bank. Compared to other years, the Rapids/Rampart fish wheel CPUE during this season was very good, indicating a good fall chum salmon run. Although the gross catches appeared very good, the first preliminary passage estimate from the Rapids/Rampart mark-recapture project verified the lower river run assessment for a poor run. Through August 19, the estimated fall chum salmon passage at the Rapids/Rampart mark-recapture project site was 45,021 fall chum salmon. Despite the lack of commercial fishing, closures of both sport and personal use fisheries, and implementation of subsistence restrictions, it was determined that the 2000 fall chum salmon run would not support subsistence harvests. Subsistence fishing within the Yukon River drainage was closed on August 23 to enable remaining fall chum salmon to provide for spawning escapement needs. The Rapids/Rampart tagging study was terminated just after the average quarter point of the run. Therefore, only one population estimate was generated based on the relatively stronger front portion of the run.

The fall chum salmon catches at both the Rapids test fish wheel and DFO border tagging fish wheels were much higher than expected. High catches in both fish wheel projects were believed to be due to record high water levels experienced throughout the season.

The subsistence fishery for non-salmon species remained open seven days per week throughout the drainage. However, gillnets were limited to 4 inches or less in stretch mesh and fish wheels were excluded. During the peak of the coho salmon run in District 4 and Subdistricts 5-A, 6-A and 6-B and in areas where coho salmon were present in good numbers, subsistence fishing opportunity was provided where means existed to minimize the harvest of fall chum salmon. In these areas, subsistence fishing for coho salmon was allowed only with fish wheels that were equipped with "live chutes". These "live chutes" allowed the fish wheel operator to pass the fall chum salmon back into the river unharmed while harvesting other fish species, including coho salmon. Additionally, sections of the Yukon River drainage were reopened to normal

subsistence fishing schedules only after the majority of fall chum salmon migrated through those sections. Accordingly, the Lower Yukon area reopened September 16, District 4 reopened September 27, Subdistricts 5-B, 5-C and 5-D reopened October 1. Subdistricts 5-A, 6-A, 6-B and Upper Tanana River were reopened on October 9.

All of the lower Yukon River projects are completed at this time. Tributary escapement estimates are preliminary. Because of the closure of the subsistence fishery, the lower Yukon River set gillnet test fishery was discontinued for the season on August 21. The Pilot Station sonar project typically ends in late August, but, in 2000, the project remained operational until September 14. The preliminary, sonar-based point estimate of fall chum salmon passage by Pilot Station is 254,000 salmon (the approximate 90% confidence interval range: 237,000 to 270,000 salmon).

Pilot Station only provides an estimate of the number of salmon passing the site during its operational period. An estimate of the total Yukon River fall chum salmon run size requires an estimate of the passage by the sonar site plus the estimated subsistence harvests below Pilot Station. Because the 2000 season began with subsistence restrictions in place, the level of subsistence harvest was probably less than average. Therefore, it is very likely that the total fall chum salmon run size was less than 350,000 fish. Based on management directives contained within the *Yukon River Drainage Fall Chum Salmon Management Plan*, the management actions taken during the 2000 fall chum salmon season were appropriate.

Two aerial surveys for fall chum were conducted on the Toklat River in 2000. Ground surveys were also conducted on the Toklat River in late October. The preliminary population estimate (based on aerial surveys) was 5,095 fall chum salmon which is 85% below the minimum escapement goal of 33,000 chum salmon. The preliminary abundance estimate of the number of chum salmon that spawned in the Delta River was 2,095 chum salmon 81% below the minimum escapement goal of 11,000 chum salmon. This is based on the results from eight ground surveys made of the Delta River fall chum salmon spawning area between October 3 through November 27, 2000.

It is unfortunate that the size of the 2000 fall chum salmon run required subsistence users throughout the drainage to be burdened with restrictions and eventual closures in order to meet escapement requirements. Compliance with the subsistence salmon fishing restrictions was relatively good considering closures were imminent. While imposing these restrictions, the department worked extensively with users throughout the drainage to provide subsistence fishing opportunity for other fish species. In addition to normal daily communications between the department, USFWS and individual fishers, teleconferences were held prior to implementation of additional restrictions and subsistence salmon fishing closures. During these teleconferences information from throughout the drainage was exchanged among all parties. Fishing schedules were altered in particular areas based on information provided by fishers during these teleconferences.

All fall chum and coho salmon caught in test fisheries in 2000 were given away to local residents. These fish will be included in reported subsistence harvests.

Yukon River coho salmon have a slightly later, but overlapping, run timing with that of the fall chum salmon run. In managing the coho salmon run, the department follows guidelines adopted in November 1998 by the Board of Fisheries in 5 AAC 05.369. *Yukon River Drainage Coho Salmon Management Plan*. The coho salmon management plan allows a directed coho salmon commercial fishery only under special and unique situations. It is very unlikely that conditions outlined in the coho salmon management plan will occur. In most years, fall chum salmon is the primary species of management concern during the fall season. In 2000, no directed commercial coho salmon fishing periods were allowed because of the weakness of the fall chum salmon.

Several strong pulses of coho salmon entered the Yukon River beginning August 10, as detected by the lower Yukon River set gillnet test fishery. Pilot Station sonar estimated that approximately 97,000 coho salmon passed the site by August 21, indicating that the 2000 coho salmon run was above average for this date. However, the strength of the run tapered off as the later portion of the run declined. The final passage estimate at Pilot Station sonar was 183,000 coho salmon (approximate 90% confidence interval range: 169,000 - 198,000). This total passage estimate suggests that the early strength in the coho salmon resulted in an average run size with slightly early run timing.

Two aerial surveys for fall chum or coho salmon were conducted on the Toklat River in 2000. Ground surveys were also conducted on the Toklat River in late October. The preliminary population estimate (based on aerial surveys) was 86 coho salmon. The preliminary abundance estimate of coho salmon that spawned in the Delta River was 98. This is based on the results from eight ground surveys made of the Delta River fall chum salmon spawning area between 3 October through November 27, 2000.

3.0 2000 COMMERCIAL FISHERY - CANADA

A preliminary total of 0 chinook salmon, 1,319 chum salmon and 0 coho salmon was harvested in the Canadian Yukon River commercial fishery in 2000 (Table 4). The combined species catch of 1,319 was 95% below the previous ten-year average commercial harvest of 27,852 salmon. As in 1998 and 1999, the poor catch was the result of below average run sizes of upper Yukon River chinook and chum salmon.

A total of 20 commercial licenses was issued in 2000, the same as in 1999.

3.1 Chinook Salmon

The 2000 preseason expectation for Canadian-origin mainstem Yukon River chinook salmon was for a total run of 91,000 to 128,000 fish. A run size in this range would be weak- to- average in magnitude when compared to the previous cycle average of approximately 123,000 fish (1994-1999). The outlook was expressed as a range due to the uncertainty associated with marine survival of the fish that spawned between 1992 to 1997. The potential for reduced marine survivals was made apparent by the poor returns of upper Yukon chinook salmon in 1998 and 1999, which were significantly lower than expected.

The elements of the chinook salmon management plan for 2000 included:

i) a minimum escapement goal of 28,000 chinook salmon. This goal was the same as that agreed to by the Yukon River Panel in the spring of 1996 which was to be in effect through 2001;

ii) reasonable access to the salmon resources would be allowed within the bounds of conservation and the priority afforded to the aboriginal fishery;

iii) based on the preseason forecast and accounting for the priorities of conservation and the needs of the aboriginal fishery, it was expected that the commercial harvest would fall within a range of 0 to 8,000 chinook salmon; and

iv) Subject to there being no conservation concerns, an initial fishery opening of 48 hours was scheduled to occur on the fifth day after the run was deemed to have commenced. The beginning date of the run was to be determined by an increasing trend in the Fisheries and Oceans Canada fishwheel catches. The first fishing period was to be followed with a 4-day closure. Additional openings would occur thereafter on a weekly basis depending upon the status of the run. The '4-2-4' season opening schedule for the commercial fishery, i.e. 4 days closed - 2 days open - 4 days closed, was first adopted in 1998.

Well before chinook salmon had entered the Canadian section of the upper Yukon River, sufficient conservation concerns had already arisen to abandon the opening schedule proposed in the fishing plan. Alaskan test fishing, sonar and catch indices all indicated a run size far below

normal and perhaps worse than 1998 and 1999. Run size indices that were lower than these years were particularly troubling since the returns to the Canadian section of the drainage were record low: 22,600 border escapement in 1998; 23,600 in 1999. As a result, through consultation with the Yukon Salmon Committee (YSC), the opening of the Canadian commercial fishery was postponed until sufficient assessment data became available in Canada to justify an opening. This decision was made following precautionary principles and despite the fact that there had already been limited commercial openings in Alaska.

The postponement of the opening of the commercial fishery created the need to implement a test fishery to provide stock assessment data for inseason run forecasting. The test fishery operated similar to that of 1998 involving both First Nation and commercial fishers working together in teams under the direction of the Tron'dek Hewechin First Nation and the Yukon River Commercial Fishing Association with funding from the Yukon Restoration and Enhancement Fund. The objective of the test fishery was to collect timely catch and tag recovery data that could be used in developing reliable inseason run forecasts. More information about the test fishery and results of this project appears in Sections 6.2.1. Without the tagging data, there would be little else upon which to rely for inseason run assessment. The option of just using the DFO fishwheel catch was not exercised because of the poor historical relationship between catch and run size. In addition, unusually persistent high water conditions raised doubts regarding the comparability of catches this year with other years. In retrospect, had the fishwheel catches been used as a measure of run abundance, the forecasts would have over-estimated the run size.

Although the catches in the DFO fishwheels were well above average throughout the season, the run forecasts indicated poor abundance ranging from a border escapement of 13,300 to 27,200 salmon in the third week of July to 20,400 chinook in the second week of August. In the test fishery, the numbers of tagged fish in the catch were much higher than normal indicating that a higher proportion of the run was being tagged this year compared to previous years. For example, on average approximately 9% of the fish captured in the test fishery were tagged; whereas in previous years, the proportion tagged in the Dawson area catch is usually less than 4%. It is likely that high water conditions contributed to higher tagging rates observed in 2000.

With the run forecasts being well below what was required for spawning requirements and the needs of the First Nation fishery, the commercial fishery remained closed for the entire chinook season, the first time in history.

3.2 Fall Chum Salmon

Similar to the chinook run outlook, there was much uncertainty surrounding the 2000 preseason expectations for Canadian-origin upper Yukon chum salmon. Spawning escapements in 1995 and 1996, the primary brood years contributing to the 2000 run, were 158,100 and 122,400, respectively, the highest on record and well above the rebuilding target of >80,000 chum salmon. However, the run in 1999 which was also the product of excellent spawning escapements, was well below average. Low returns in 1999 and also in 1998 appeared to have been significantly impacted by poor marine survival. It was surmised that this again could result in a depressed run

in 2000. To capture this uncertainty, the total run outlook was expressed as a range from 107,000 (below average), to 334,000 (above average) upper Yukon chum salmon.

The Canadian chum salmon management plan for 2000 was developed with the following components:

i) A spawning escapement goal of >80,000 upper Yukon chum salmon which was consistent with the rebuilding objective adopted by Canada and the U.S. in the course of Yukon River salmon negotiations;

ii) reasonable access to the salmon resources would be allowed within the bounds of conservation and the priority afforded to the aboriginal fishery, and;

iii) given the uncertainty regarding the preseason run outlook, and accounting for the priorities of conservation and the needs of the aboriginal fishery, it was suggested that the allowable catch remaining for commercial fishers would be in the range of 0 to 148,000 fish. However, the plan was explicit in stating that there existed the potential for severely restricted fisheries.

Heading into the chum salmon season, most of the run assessments in Alaska, particularly the Pilot Station sonar estimate, had indicated low fall chum salmon abundance. This prompted the decision by Canadian managers to continue the commercial fishery closure until sufficient run assessment data could be compiled in Canada to rationalize opening the fishery. Again, as occurred during the chinook season, the capability to obtain tag recovery data for use in mark-recapture estimates was hampered by the absence of the commercial fishery, which is the source of this data in most years. However, unlike chinook salmon, there has been a statistically significant relationship between the DFO fishwheel catches of chum salmon and border escapement estimates ($r^2 = 0.74$, 15 observations). Because of this, it was decided that the fishwheels would serve as the primary run strength index until tagging data became available.

The combined daily catches in the DFO fishwheels were below average through September 2, however they increased dramatically to above average values after that time. Run forecasts, based on the projected fishwheel catch for 2000 (current catch expanded by run timing scenarios) and the linear regression of historical catches and corresponding border escapement estimates, showed a steady increase from a range of 87,000 to 107,000 on September 5, to a forecast range of 112,000 to 132,000 on September 10. By September 10, the cumulative fishwheel catch was 54% above the previous 10-year average. It was acknowledged that the high water conditions which had continued to persist into the chum salmon season, would likely increase the efficiency of the fishwheels and therefore cause them to overestimate abundance; however, it was not known by how much. To help quantify this and in light of the forecast range being well above levels that justified a limited fishery, the commercial fishery was opened for one, 24-hour period commencing noon, September 15.

A total of seven fishers participated in the opening catching a total of 1,319 chum salmon, of which 55 fish were tagged (DFO tags). The CPUE for this opening 188 chum/fisher/day was 8%

below the 1990-1999 average for this week. The run forecast, derived from tag recapture data collected during this opening augmented with limited data from the Aboriginal fishery, suggested a run size of 79,500 (border escapement). This estimate was approximately 29% below the September 10 forecast of 112,000 based solely on fishwheel catch data. (Note: both estimates used timing data extracted from the Pilot Station count in 2000; whereas, the upper range of the September 10 projection, i.e. 132,000 was derived from historical average fishwheel timing).

As a result of the decreased run forecast, no further openings in the commercial fishery were scheduled. Forecasts were updated with additional tag recovery data provided from the Aboriginal fishery, however they progressively decreased to the final inseason forecast, produced October 10, of 69,500 chum salmon.

The total commercial chum catch of 1,319 fish was 93% below the previous 10-year average. For comparison, the previous 10-year average commercial catch was 19,287 chum (1990 to 1999); during this period the catch ranged from 0 chum in 1998 to 39,012 chum in 1995. Most of the chum salmon caught by commercial fishers in 2000 went towards meeting personal requirements and was not sold. With only one day of fishing, total effort was down significantly in 2000: 7 boat-days of effort compared to the 1990-1999 average of 123 boat-days.

4.0 2000 SUBSISTENCE, PERSONAL USE, ABORIGINAL, DOMESTIC, AND SPORT FISHERIES

4.1 Alaska

4.1.1 Subsistence Fishery

Subsistence "catch calendars" for use during the fishing season were mailed in May to rural community households in the non-permit portions of the Yukon River drainage in Alaska. Catch calendars are collected during the personal interviews conducted with fishermen immediately following the season in September and October. Subsistence fishermen in portions of District 5 (upper Yukon River drainage) and District 6 (Tanana River drainage) are required to obtain subsistence salmon fishing permits and record harvest data on the permit. Personal use permits are required for fishermen who fish in the Fairbanks Non-subsistence Area. Additionally, attempts are made to contact fishermen by telephone or mail. Subsistence salmon fishery restrictions were implemented July 19 with further reductions initiated on August 12 and closures effective August 23. These actions are expected to seriously reduce subsistence salmon harvests. The estimated 1999 subsistence salmon harvest in the Alaska portion of the Yukon River drainage totaled approximately 53,000 chinook, 84,000 summer chum, 90,000 fall chum and 21,000 coho salmon. These estimates do not include personal use catches in the Fairbanks Non-subsistence Area and do not include commercially caught salmon carcasses retained for subsistence purposes. Preliminary analysis of 2000 subsistence harvest data will not be completed until the spring of 2001.

4.1.2 Personal Use Fishery

Regulations in effect from 1988 until July 1990 prohibited non-rural residents from participating in subsistence fishing. In those years, non-rural residents harvested salmon under personal use fishing regulations. The Alaska Supreme Court ruled in July 1990 that every resident of the State of Alaska was an eligible subsistence user, making the personal use category essentially obsolete. From July 1990 through 1992 all Alaskan residents qualified as subsistence users. In 1992 during a special session of the legislature, a subsistence law was passed which enabled the Alaska Joint Boards of Fisheries and Game to designate non-subsistence areas. This law allowed the boards, acting jointly, to identify an area or community where subsistence was not a principal characteristic of the economy, culture, and way of life. The Fairbanks Non-subsistence Area was the only non-subsistence use area identified by the Joint Boards of Fisheries and Game in the Yukon River drainage. This area encompasses the Fairbanks North Star Borough and surrounding areas. In October 1993, a Superior Court ruled that this 1992 subsistence law was unconstitutional. The State was immediately granted a stay, which allowed for status quo fishing regulations to remain in effect until April 1994. At that time, the Alaska Supreme Court vacated the State's motion for a stay. This action allowed all Alaskan residents to be eligible to fish for subsistence purposes during the 1994 fishing season.

In 1995, the Joint Board of Fisheries and Game reestablished the Fairbanks Non-subsistence Area. Subsistence fishing is not allowed within non-subsistence areas. This new regulation primarily affected salmon fishermen within Subdistrict 6-C, which falls entirely within the Fairbanks Non-subsistence Area. Since 1995, the Subdistrict 6-C salmon fishery has been managed under personal use regulations. Personal use salmon harvest in this subdistrict is limited to 750 chinook salmon, 5,000 summer chum salmon, and 5,200 fall chum and coho salmon combined. Preliminary data compilation for the 2000 fishing season will not be completed until the spring of 2001. Personal use harvests within the Fairbanks Non-subsistence Area will only include minimal harvests of summer chum and chinook salmon prior to the personal use salmon fishing closure which extended from July 14 through October 15 in 2000. No personal use harvest of fall chum and coho salmon occurred in 2000. In 1999, 103 fishermen were issued personal use salmon fishing permits. During that year, fishers fishing under personal use regulations harvested approximately 330 chinook, 380 summer chum, 260 fall chum and 150 coho salmon.

4.1.3 Sport Fishery

Sport fishing effort for anadromous salmon in the Yukon River drainage is directed primarily at chinook, chum, and coho salmon. The majority of the effort occurs in the Tanana River drainage, mostly along the road system. During 1994-1998, 90% of the harvest of chinook salmon, 80% of the harvest of chum salmon, and 77% of the harvest of coho salmon was taken from the Tanana River system. Most chinook and chum salmon are harvested from the Chena, Salcha, and Chatanika rivers, while most coho salmon are harvested from the Delta Clearwater and Nenana River systems. Sport fishing effort and harvests are monitored annually through a state-wide sport fishery postal survey. Some on-site fishery monitoring also takes place during some years at locations where more intense sport fishing occurs, although no on-site monitoring was conducted during 2000. Although some fall chum salmon may be taken by sport fishers, the majority of the harvest of that species is thought to come from the summer chum salmon run because 1) that run is much more abundant, and 2) the chum harvest is typically incidental to effort directed at chinook salmon which overlap in timing with summer chum. For these reasons, all of the sport fishing chum salmon harvest is reported here as summer chum salmon. Yukon River drainage sport harvest estimates for recent years (1994-98) have averaged about 2,302 chinook salmon, 912 chum salmon, and 1,425 coho salmon. Sport harvest of salmon in the Alaskan portion of the Yukon River drainage in 1998 was estimated to total 654 chinook salmon, 421 chum salmon, and 758 coho salmon. At this time, harvest data are not yet available for 1999 or 2000. Because of the poor runs, sport fisheries were closed for both chinook and chum salmon beginning July 16. Salmon sport fisheries were re-opened on August 14, after peak spawning had occurred.

4.2 Canada

4.2.1 Aboriginal Fishery

The fifth year of a multi-year comprehensive survey of the Aboriginal fishery was conducted in 2000 as part of the implementation of the Yukon Comprehensive Land Claim Umbrella Final

Agreement. The project entitled: *The Yukon River Drainage Basin Harvest Study*, is being conducted by LGL Ltd. Environmental Research Associates, and primarily involves intensive inseason surveys of catch and effort in the fishery throughout the upper Yukon drainage, excluding the Porcupine drainage. Catch estimates from the Porcupine River in the Old Crow area are determined independently from locally conducted, post season interviews.

The preliminary estimate of the 2000 total upper Yukon chinook salmon catch in the Aboriginal fishery is 3,889 fish (std = 200), 48% below the 1990-1999 10-year average of 7,491 chinook and 56% below the final estimate of 8,804 (std = 489) chinook in 1999. The total fishing effort during the chinook season, i.e. through the end of August, was 18,186 net-hours, 36% below the 1996-1999 average of 28,250 net-hours. The reduction in effort is the result of voluntary cutbacks in fishing activity undertaken by most Yukon First Nations in 2000. The cutbacks followed an appeal from the YSC on July 14, urging reductions in fishing time to no more than two days per week.

The preliminary estimate of the 2000 harvest of upper Yukon chum salmon in the Aboriginal fishery is 2,476 fish (std = 306) through October 14. Usually the fishery is virtually completed by this date. This preliminary estimate is 7% below the 1990-1999 average of 2,500 chum salmon. The preliminary estimate of total fishing effort during the chum season (September on) was 1,594 net-hours, approximately 67% below the 1996-1999 average. The final chum catch estimate for 1999 was estimated to be 3,104 fish (std = 391) and the effort totaled 3,523 net-hours.

Harvest data from the Vuntut Gwitchin First Nation fishery near Old Crow on the Porcupine River are not yet available. Preliminary reports indicated the chinook catch was poor. The 1990-1999 average catch in this fishery includes 297 chinook, 3,721 chum and 296 coho salmon. Catches in 1999 included 114 chinook, 6,000 chum and 100 coho salmon.

4.2.2 Domestic Fishery

The domestic fishery was closed for the entire season due to conservation concerns.

4.2.3 Sport Fishery

In 1999, a mandatory Yukon Salmon Conservation Catch Card was introduced by the Yukon Salmon Committee in an attempt to improve harvest estimates and to serve as a statistical base to ascertain the importance of salmon to the Yukon sport fishery. Anglers are required to report their catch via mail by the late fall. Information requested includes: the number, sex, size, date and location of salmon caught and released. The preliminary estimate of the sport catch of Yukon River drainage chinook salmon in 1999 is 278 fish (well below the estimate of 500 chinook reported in Attachment I, Table 4 of the 1999 JTC report); an additional 191 chinook salmon were live-released in 1999.

Estimates of salmon catches in the 2000 Yukon sport fishery are not yet available. However, due to conservation concerns, effective midnight July 17, the daily catch and possession limit for

salmon (i.e. including both chinook and chum salmon) in the upper Yukon River drainage, was varied to zero. Since the timing of this closure was prior to the time when most sport fishing activity for salmon normally occurs, it is expected the catch was very low.

5.0 2000 STATUS OF SPAWNING STOCKS

5.1 Chinook Salmon

5.1.1 Alaska

Yukon River chinook salmon abundance in 2000 was assessed as well below average and the weakest run since statehood based on commercial harvest data and on escapement counts and estimates from selected tributaries. Production from the 1994 and 1995 parent year appears to have been especially poor given the unexpectedly weak return of 5- and 6-year-old chinook salmon in 2000. Ground-based chinook salmon escapement counts and estimates from 5 projects in 2000 were 90% below the recent 5-year average. Successful aerial survey observations were made in 5 of the 8 Yukon River tributaries with established biological escapement goals (BEGs). Minimum aerial survey escapement goals were achieved in two of these surveyed tributaries, the Anvik and Salcha rivers. Minimum aerial survey escapement goals have been established in the East and West Fork Andreafsky, Anvik, North and South Fork Nulato, Gisasa, Chena and Salcha Rivers within the Alaska portion of the Yukon River.

The chinook salmon escapement into the Andreafsky River was well below desired escapement levels. Acceptable surveys were completed on both the East and West Fork Andreafsky Rivers. The aerial survey count on the East Fork Andreafsky was 1,018 chinook salmon. This is two-thirds the aerial survey goal and roughly half the recent 10-year average of acceptable surveys. There were 427 chinook salmon counted on the West Fork Andreafsky, roughly one-third the escapement goal and 70% below the recent 10-year average of acceptable surveys. The USFWS weir count of 1,358 chinook salmon for the East Fork Andreafsky River was 65% below the 5-year average weir count of 3,868. Age and sex composition samples were collected in 2000 from fish passing through the East Fork Andreafsky River weir. The estimated age composition was 13% age-4, 49% age-5, and 38% age-6 fish. Females dominated the escapement samples, accounting for 54% of the total number sampled.

An aerial survey of the Anvik River conducted under good conditions resulted in a count of 1,394 chinook salmon within the escapement index area. This count nearly tripled the minimum escapement goal of 500. Age and sex composition samples were collected in 2000 by carcass survey. Six-year-old chinook salmon dominated the samples, comprising 53% of the total with four and five year old fish (5% and 42%, respectively) comprising the remainder. Males were more numerous than females, accounting for 59% of the samples collected.

Minimum aerial survey index escapement goals are 800 chinook salmon for the North Fork and 500 for the South Fork Nulato River. No aerial surveys were possible in 2000 because of inclement weather. An estimate of chinook salmon escapement was provided from a salmon counting-tower project operated by the Nulato Tribal Council, Bering Sea Fishermen's Association (BSFA) and ADF&G, located below the forks on the mainstem Nulato River. The preliminary tower count of 908 chinook salmon was 70% below the recent 5-year average of 2,080 fish. Age, sex and length information was not collected in 2000.

The minimum aerial survey escapement goal for the Gisasa River is 600 chinook salmon. No aerial surveys were possible in 2000 because of inclement weather. The USFWS estimated a total of 2,089 chinook salmon migrated through the Gisasa River weir, which was 29% below the 1995-1999 average of 2,945. The weir was operated between June 28 and August 7. High river flow prevented an earlier deployment of the weir. The first chinook salmon was counted on July 6. Between July 14 and 24, 61% of the chinook escapement passed through the weir. Age and sex composition samples were collected in 2000. The estimated age composition was 7% age-4, 51% age-5, and 40% age-6 fish. Males dominated the escapement samples, accounting for 66% of the total sample.

A weir was operated on Henshaw Creek between July 8 and August 13. This was the first of a multi-year monitoring effort using a weir to estimate escapement in this river. Previously, a counting tower, located near the mouth, was used in 1999 and aerial surveys were conducted intermittently since 1960. High river flows prevented earlier deployment of the weir. Also, there were eight days (non-consecutive) when high river flows prevented fish counts. The escapement through the weir was estimated at 194 chinook. The first chinook salmon was counted on July 10 and the last on August 5. Most of the chinook run (82%) was believed to have passed through the weir between July 12 and 22. Although age and sex information was collected, the sample size was small and not representative of the escapement. No aerial survey was completed on Henshaw Creek because of turbid water conditions.

Aerial surveys were flown on selected Koyukuk River tributaries. Aerial surveys flown under fair conditions observed 74 chinook salmon in the South Fork Koyukuk River and 79 chinook salmon in the Jim River.

Since 1993, inseason assessment of chinook salmon escapement to the Tanana River drainage has been primarily based on counts of chinook salmon passing the Chena and Salcha River tower sites. These projects were operated by Sport Fish Division of ADF&G. In 2000, a private contractor monitored salmon escapement to the Salcha River with funding from BSFA. High, turbid water hampered the operations on the Salcha River for short intervals during the 2000 season. Because of turbid conditions throughout the season on the Chena River, a mark-recapture study was conducted. The preliminary mark-recapture tagging estimate for the Chena River was 4,707 chinook salmon, which was 43% lower than the recent 5-year escapement average of 8,227 fish. The preliminary tower count estimate for Salcha River was 3,108 chinook salmon, which was 71% below the recent 5-year average of 10,844 fish. The minimum aerial survey escapement goals for the Chena River and Salcha River index areas are 1,700 and 2,500 chinook salmon, respectively. Incomplete aerial survey counts on both rivers resulted in counts of 934 chinook salmon for the Chena River index area and 2,478 chinook salmon for the Salcha River index area. Because the survey on the Salcha River was incomplete and the count very near the goal, the aerial survey escapement goal was most likely met. Age and sex composition samples were collected in 2000 from carcass surveys on the Salcha River and from both electro-fishing and carcass sampling activities on the Chena River. However, there were not enough samples from the Salcha River for a quality age composition estimate. The combined age composition estimated from all samples collected in the Chena

River was 20% age-4, 36% age-5, 36% age-6 and 8% age-7 fish. Females were more numerous than males, accounting for 35% of the samples.

In 2000, the U.S. Department of the Interior, Bureau of Land Management (BLM) operated a weir on Beaver Creek; 114 chinook salmon were counted passing through the weir. This is 46% below the project's average (1996, 1997 and 1999) of 211.

5.1.2 Canada

The preliminary mark-recapture estimate of the total spawning escapement for the Canadian portion of the upper Yukon drainage is 12,566 chinook salmon, 47.5% of the 1990-1999 average of 26,453 chinook. Results of the Fisheries and Oceans Canada tagging program are discussed in greater detail in Section 6.2.1. of this report.

Aerial surveys were conducted by DFO of index areas on the Little Salmon, Big Salmon, Wolf and Nisutlin rivers, one survey per index area. The Tincup Creek survey was not flown, however there is information available from a ground survey. Survey results relative to the previous cycle averages are presented below. Index surveys are rated according to fish countability. Potential ratings include excellent, good, fair and poor. Surveys with ratings other than poor are considered useful for inter-annual comparisons. Historical counts are documented in Attachment I, Table 10.

The Little Salmon aerial survey was flown on August 18. Countability was rated as poor-fair. One surveyor participated in the survey and 46 chinook salmon were counted. Due to the low initial count a three kilometer section of the river above and below the confluence of Bearfeed Creek was resurveyed. The second survey confirmed the low number of spawning fish. This area typically has the highest concentration of spawning chinook salmon. The 2000 count was 7.4% of the recent average (1990-1999) of 621. A total of 19 chinook salmon were counted during the ground surveys of Tincup Creek. This count is 19.6% of the average aerial survey count of 97 for the 1990 to 1999. The Big Salmon, Nisutlin, and Wolf river index areas were flown on August 23. As in 1999, good-excellent viewing conditions were encountered, although water levels were slightly higher than normal. A count of 113 chinook salmon was enumerated in the Big Salmon River index area, 9.5% of the recent average of 1,190. The Nisutlin River index count of 20 chinook salmon was only 5.3% of the recent cycle average of 374. In the Wolf River index area, a high count of 32 chinook salmon was observed; this count was 12.7% of the cycle average of 251.

Timing of the aerial surveys of the Big Salmon, Nisutlin and Wolf Rivers appeared to be slightly later than peak spawning. Abandoned redds were observed in all index areas and many unused redds were also observed.

Single aerial surveys do not count the entire escapement since runs are usually protracted with early spawners disappearing before the late ones arrive. Weather and water conditions, spawner density, as well as observer experience and bias also affect accuracy. The low number of spawners observed in 2000 was alarming to the surveyors. The counts appeared inconsistent with

what was expected based on previous surveys and the anticipated escapement based on the mark-recapture estimate. There was an option to conduct a second survey of some or all of the index areas, however this was deemed unnecessary because the trend was the same for all index areas and there was no indication that the fish were late or that spawning in 2000 was atypical.

The Whitehorse Rapids Fishway chinook salmon count of 677 fish, provided by the Yukon Fish and Game Association, was 46% of the recent average (1990-99) of 1,472. The sex composition observed at the fishway was 56% female. The quality of escapement in the current year is a substantive improvement over many recent years, which had a low number of female chinook and a high proportion of small males.

The Blind Creek weir project was conducted by the Ross River Dena Council, however information on the operational period and final count is not available. A total of 892 chinook salmon were counted between August 1 and August 22 in 1999. Counts for the two other years of weir operation were 957 and 373 for 1997 and 1998, respectively.

For the fourth consecutive year, a weir was installed on Tatchun Creek by Quixote Consulting. Enumeration commenced on August 2 and terminated on August 24, when the weir was damaged due to high water conditions. A total of 241 chinook salmon was observed. Previous weir counts were 250 in 1999, 405 in 1998 and 1,198 in 1997.

The Yukon Commercial Fishers Association installed a weir on the Chandindu River for the third year in a row. The weir was operated from August 16 to September 15. The weir was installed later than planned due to extremely high water conditions. A total of 4 chinook salmon and 21 chum salmon was counted. Previous counts were 239 chinook and 92 chum salmon in 1999 and 132 chinook salmon and 23 chum salmon in 1998.

Additional aerial or ground surveys for chinook salmon enumeration were conducted on streams which have not been subject to long term, consistent monitoring. These surveys were conducted by Yukon First Nations through the DFO Aboriginal Fisheries Strategy, or by consulting firms or private individuals. Ground surveys included Tincup and Flat creeks. Aerial surveys of the Jennings, Gladys, Swift and Morley rivers were conducted by the Teslin Tlingit Council on August 28; totals of 6, 4, 2 and 4 chinook salmon were counted, respectively. Late survey timing and difficult survey conditions may have contributed to these low counts.

5.2 Summer Chum Salmon

Preliminary post-season analysis of escapement data indicates the 2000 summer chum salmon run was very weak. Spawning escapements to selected tributaries were similar to, or below those observed in 1998 and 1999, and well below most other years for each project. No escapements in monitored tributaries met minimum goals or were considered adequate with the possible exception of Salcha River. Most likely, Salcha River's escapement goal was achieved when compared to previous tower and aerial survey escapement estimates. Otherwise, summer chum salmon escapement counts and estimates for 2000 ranged from 44% to 84% below recent

5-year averages. Aerial surveys were hampered by poor weather conditions in most of the drainage.

Minimum aerial survey-based escapement goals for summer chum salmon have been established for the East and West Fork Andreafsky River, North Fork Nulato River, Clear and Caribou creeks of the Hogatza-Koyukuk River drainage, and the Salcha River. Because these minimum escapement goals are based on aerial survey index counts, they do not represent the total escapement to the spawning tributary. The escapement goal for summer chum salmon in the Anvik River is based on a spawner-recruit analysis of total escapement estimates and sonar counts attributed to summer chum salmon escapement.

The preliminary Anvik River sonar-based escapement count of 205,460 summer chum salmon was approximately 59% below the minimum escapement goal of 500,000 and the lowest since sonar project began in 1979. The run was weaker than expected. The 2000 run were fish produced from parent-year escapements of 1,339,418 in 1995 and 933,240 in 1996. Age and sex composition samples were collected from beach seine catches in 2000. The age composition of those samples was 1% age 3, 74% age-4, 23% age-5, and 2% age-6 fish. Females comprised 63% of the sample.

Weir projects were operated by USFWS on the East Fork Andreafsky and Gisasa rivers, and Henshaw Creek. A preliminary count of 23,349 summer chum salmon were passed through the weir on the East Fork Andreafsky River. This count was 73% below the recent 5-year average of 86,311 fish. The summer chum salmon minimum aerial survey escapement goals for the East and West Fork Andreafsky Rivers are 109,000 and 116,000 fish, respectively. Aerial surveys were conducted on the Andreafsky River for summer chum salmon in 2000. However, because of poor weather conditions, the surveys were not conducted at peak spawning activity for chum salmon. Therefore, these results are not useable. The age composition of samples collected at the East Fork Andreafsky weir was 59% age-4, 38% age-5, and 3% age-6 fish. Females made up 48% of the total number sampled.

A weir was operated on the Gisasa River between June 28 and August 7. High river flows prevented earlier deployment of the weir. The estimated escapement by the weir site was 14,410 chum salmon. The 2000 summer chum salmon run into the Gisasa River was 80% below the 1995-1999 average run of 70,885 fish. Chum salmon were counted the first day the weir was in operation; an unknown portion probably passed the weir site before the weir was operational. During the 16-day period between July 5 and 20, 73% of the run passed through the weir. Age and sex composition samples were collected in 2000. The age composition of those samples was 36% age-4, 61% age-5, and 3% age-6 fish. Females made up 50% of the total number sampled.

A weir was operated on Henshaw Creek between July 8 and August 13. This was the first of a multi-year monitoring effort using a weir to estimate salmon escapement into this river. Previously, a counting tower located near the mouth was used in 1999 and aerial surveys intermittently since 1960. High river flows prevented earlier deployment of the weir. Also, there were eight days (non-consecutive) when high river flows prevented fish counts. The

escapement through the weir was estimated at 24,406 chum salmon. Chum salmon were counted the first day the weir was in operation; an unknown proportion of the run probably passed the weir site before the weir was operational. During the 10-day period between July 17 and 26, 65% of the run passed through the weir. Age composition of fish sampled at the Henshaw Creek weir was 1% age-3, 58% age-4 and 41% age-5 fish. The sex ratio using weir data was 57% female fish.

Although aerial surveys were conducted throughout the drainage in 2000, chum salmon were typically past peak spawning and any recorded aerial survey counts are not accurate indices of the escapement.

Counting-tower projects were operated on Kaltag Creek, Nulato River, Clear Creek, and Chena and Salcha rivers. The Kaltag Creek tower project was operated by the City of Kaltag and funded by the Alaska Cooperative 4-H Extension Service and BSFA. The Nulato Tribal Council and ADF&G jointly operated the Nulato River tower project, with partial funding provided by BSFA. USFWS and Tanana Chiefs Conference (TCC) operated a counting tower on Clear Creek, a tributary of the Hogatza River within the Koyukuk River drainage. The Salcha River tower project was subcontracted by BSFA, with support from ADF&G.

The preliminary estimated summer chum salmon escapement into Kaltag Creek in 2000 was 6,727 fish, which was 82% below the recent 5-year-average escapement of 37,979 fish but 27% more than the 1998 passage of 5,300 fish. While no escapement goal has been established for Kaltag Creek, this escapement was considered very poor.

The estimated summer chum salmon escapement into the Nulato River (both forks combined) was 24,308 fish, which was 80% below the recent 5-year-average of 120,755 fish. Based on this tower count, the aerial escapement goal of 53,000 summer chum salmon was not met. An aerial survey of the Nulato River targeting summer chum salmon was not conducted because of poor weather conditions. Age and sex composition samples were not collected in 2000.

Within the Hogatza River drainage, 18,698 summer chum salmon were counted as they passed the Clear Creek tower project site. This escapement estimate was 75% below the recent 4-year (1995-1999, excluding 1998) average escapement of 76,350 fish but 65% above the previous lowest value of 11,300 fish in 1999. While no tower-based escapement goal has been established for Clear Creek, the aerial escapement goal is a minimum of 8,000 summer chum salmon. Therefore, it is likely that the escapement goal was not met. No aerial surveys were flown because of poor weather conditions. Age and sex composition on Clear Creek was 21% age-4, 77% age-5 and 2% age-6 fish. Females accounted for 44% of the sampled fish.

High, turbid water periodically hampered visibility and hampered tower-counting operations on the Chena and Salcha Rivers during the 2000 season. The Chena River tower count was 3,515 summer chum salmon, which was 57% below the recent 5-year (1995-1999) average count of 8,167 fish. The Salcha River tower count of 20,516 summer chum salmon was 44% below the recent 5-year (1995-1999) average of 36,372 fish. Aerial surveys of were conducted but were incomplete because of poor weather conditions. Chum salmon carcasses were

unavailable for age and sex composition samples in 2000 from either river because of high water conditions.

In 2000, BLM operated a weir on Beaver Creek. Only 12 chum salmon were counted past the weir. No age and sex samples were collected.

5.3 Fall Chum Salmon

5.3.1 Alaska

The 2000 preseason run projection for Yukon River fall chum salmon ranged from 530,000 to 1,100,000 fish. The high end of the range was derived from normal run size expectations for the good parent-year escapements realized throughout the drainage in 1995 and 1996. The low end of the range was primarily based upon the expectation of continued extremely poor production from adequate parent-year escapements.

Although final assessments of overall run size, spawner distribution and age composition are not yet available, preliminary indications are that the 2000 Yukon River fall chum salmon run was well below the low end of the preseason projection range. In general, the fall chum salmon run could be characterized as having relatively strong components in the early portion of the run followed by extreme weakness in the remainder of the run. This type of entry pattern resulted in run timing that appeared earlier than average.

As discussed in the commercial fishery review for 2000 (Section 2.2), the fall chum salmon passage estimate, based on Pilot Station sonar for the period July 19 through September 14, was approximately 254,000 fish (approximate 90% confidence interval range: 237,000 - 270,000). Note, however, that this current run size estimate does not include the limited subsistence harvests taken downstream of the Pilot Station sonar site. Data from both the Mountain Village and Kaltag test fish projects also suggest that the 2000 run was extremely weak.

A review of upper river test fish data and escapement information suggests that the upper Yukon River (non-Tanana) and Tanana River run components were weak and similar in size to those observed in 1998. The USFWS mark-recapture project near Rampart provided only one passage estimate prior to project termination. The mark-recapture passage estimate through August 19 was 45,020 fall chum salmon. The project was terminated early because of conservation concerns. However, the estimate of fall chum salmon passage through that date was the second lowest to date. Only the 1998 estimate was lower, approximately 24,000 fish, for the 5 years of operation. The expanded, total fall chum passage estimate, based on run timing, was also most similar to the 1998 estimate of 198,000, and appears to be less than half of the 1997 estimate of 393,000. Likewise, escapements in Alaskan tributary streams of the upper river were weak based upon sonar counts attributed to fall chum salmon escaping to the Chandalar and Sheenjek River drainages.

In 2000, the Chandalar River sonar project ran from August 8 through September 26. The preliminary 2000 escapement estimate is approximately 70,000 upstream fish. This preliminary

estimate is approximately 41% of the 1995-1999 average of 170,703 fish (range: 75,811 in 1998 to 280,999 in 1995), and is the lowest estimate during these years. An underwater video camera was used to investigate the appearance of atypical traces during the later part of the project. This investigation revealed the presence of schools of whitefish (tentatively identified as Least cisco). Data is currently being analyzed to determine the degree to which these whitefish influenced sonar counts. Daily passage rates exceeded 1,000 fish for 34 of the 50 counting days.

Because of high water, 17 days were not counted on the right bank. However, the left bank sonar operation was uninterrupted throughout the project. The ratio estimator method was used to predict the missing right bank counts from daily left bank passage rates. A final post-season estimate will be available after all analyses are completed, and a final report will be available in spring of 2001.

By comparison, the preliminary projected escapement estimate of fall chum salmon in the Sheenjek River was only 30,022 fish. However, the Sheenjek River sonar only operated for a 36-day period from August 8 through September 12 and was terminated approximately ten days early because of extremely low water levels. This estimate may be adjusted based on final run timing in the Chandalar River. This is an extremely weak escapement observed for this river given the major parent year escapement levels: 241,855 in 1995 and 246,889 in 1996. The 2000 estimated escapement in the Sheenjek River was 53% below the minimum escapement goal of 64,000 fall chum salmon.

The fall chum salmon run into the Tanana River was also weak in 2000, based upon test fishery results from the south bank of the Yukon River near Tanana Village and from the Tanana River. Although fall chum salmon spawning ground surveys are currently being conducted in selected locations throughout the Tanana River drainage, preliminary ground surveys of the Toklat River spawning area indicate that the escapement was well below the minimum goal of 33,000 fall chum salmon and one of the weakest on record. For the upper Tanana River (upstream of the Kantishna River), the preliminary mark-recapture abundance estimate through October 2 was 47,635 ± 13,355 (95% C.I.) fall chum salmon. This upper Tanana River fall chum salmon passage estimate is the lowest on record since the project began in 1995. The estimate in 1998 of approximately 69,000 fall chum salmon, was the second lowest. The preliminary estimate for the Kantishna River run component through September 28, 2000 was 21,104 ± 6,650 (95% C.I.) similar to 1999 estimate of 27,800 fall chum salmon. The Toklat River is a tributary of the Kantishna River system, and the Kantishna River mark-recapture estimate was once again less than the spawning goal for the Toklat River spawning area. Further, it should be emphasized that these results are preliminary and may change somewhat based upon the results of further analyses.

The preliminary population estimate (based on aerial surveys) was 5,095 fall chum salmon which is 85% below of the minimum escapement goal of 33,000 chum salmon. The preliminary abundance estimate of the number of chum salmon that spawned in the Delta River was 2,095 chum salmon, 81% below the minimum escapement goal of 11,000 chum salmon. This is based on the results

from eight ground surveys made of the Delta River fall chum salmon spawning area between October 3 through November 27, 2000.

5.3.2 Canada

The preliminary fall chum salmon spawning escapement estimate based on mark-recapture data is 55,803 chum salmon. Details are presented in Section 6.2.1.

Aerial surveys conducted to date include the mainstem Yukon, Kluane and Teslin Rivers flown on October 17, October 24, and November 10, respectively. The mainstem Yukon River count was only 933 fall chum salmon; however, survey conditions were poor due to high water conditions. The average mainstem count for the 1989 to 1998 period (no survey was conducted in 1999) was 3,904. Surveys of the Kluane and Teslin Rivers counted 1,442 and 204 fall chum salmon. The average 1990-1999 counts are 8,175 and 383 respectively. Historical data are presented in Attachment I, Table 12.

In the Porcupine River drainage, the Fishing Branch River weir count, 5,053 chum salmon, was the lowest count on record and was well below the lower end of the interim escapement goal, which is 50,000 to 120,000 chum salmon. Details are presented in Section 6.2.5.

5.4 Coho Salmon

Assessment of coho salmon spawning escapement is very limited in the Yukon River drainage because of funding limitations and marginal survey conditions that often prevail during periods of peak spawning. Excluding the East Fork Andreafsky River in the lower Yukon River, most escapement information collected on coho salmon has historically been from the Tanana River drainage. Presently, only one escapement goal has been established for coho salmon in the Yukon River drainage. The Delta Clearwater River (DCR) in the Tanana River drainage has a minimum goal of 9,000 fish, based upon a boat survey of the river during peak coho salmon spawning activity in late October or early November. During the 2000 survey of the DCR, 9,225 coho salmon were counted, which slightly exceed the escapement goal. Two aerial surveys for fall chum or coho salmon were conducted on the Toklat River in 2000. Ground surveys were also conducted on the Toklat River in late October. The preliminary population estimate (based on aerial surveys) was 86 coho salmon. The preliminary abundance estimate of the number of chum salmon that spawned in the Delta River was 98 coho salmon. This is based on the results from eight ground surveys made of the Delta River fall chum salmon spawning area between October 3 through November 27, 2000.

Through a cooperative agreement between the USFWS and BSFA, 2000 marked the sixth consecutive year that East Fork Andreafsky weir operations were extended into September to collect coho salmon escapement data. A total of 8,199 coho salmon passed through the weir as of September 23, the last day of operation in 2000. The 2000 coho salmon passage into this system could be characterized as an average run, with early run timing. The preceding 5-year average passage was 7,356 coho salmon, ranging from 2,963 in 1999 to 10,901 in 1995.

6.0 2000 PROJECT SUMMARIES

6.1 Alaska

In addition to projects operated and funded by state and federal agencies, several fishery-related projects were conducted by local organizations within the Yukon River drainage, funded from a U.S. congressional appropriation through the Bureau of Indian Affairs (BIA), as well as projects supported by the US/Canada R&E Fund. A list of all projects conducted within the Alaskan portion of the Yukon River drainage, including project location, objectives, and responsible agencies or organizations, is provided in Table 5. Available results from most projects are incorporated in the fishery and stock status portions of this report. Historic project results can be found in the attached database tables and figures. Because of the relatively large number of projects conducted within the Alaskan portion of the drainage, only new projects, or projects of particular interest, are presented in detail here. These specific projects are: (1) Yukon River chinook salmon stock identification, conducted by ADF&G; (2) Yukon River sonar, conducted by ADF&G with assistance from AVCP; (3) Tanana River fall chum salmon tagging project, conducted by ADF&G with assistance from BSFA; (4) Lower Yukon River chum salmon genetic sampling, conducted by ADF&G with assistance from BSFA; (5) Upper Yukon River chum salmon genetic sampling, conducted by USFWS; (6) Yukon River chum salmon ecology studies, conducted by USGS-BRD; (7) Yukon River chinook salmon tagging and telemetry study, conducted by ADF&G; (8) Upper Yukon River fall chum salmon tagging study, conducted by USFWS and (9) Restoration and Enhancement fund project.

6.1.1 Yukon River Chinook Salmon Stock Identification

A combined analysis using scale patterns, age composition estimates, and geographic distribution of catches is used by ADF&G on an annual basis to estimate the stock composition of chinook salmon in Yukon River fishery harvests. Three region-of-origin run groupings of chinook salmon, or runs, have been identified within the Yukon River drainage. The lower and middle run stocks spawn in the Alaska portion of the drainage, and the upper run stock spawns in the Canadian portion of the drainage.

Scale pattern analysis (SPA) is used to apportion the major age group(s) of the District 1, 2, 3, and 4 chinook salmon harvest to region of origin, or stock. Minor age groups in these harvests are apportioned to run of origin based on the presence of those age classes in the run-specific escapement relative to the other run-specific escapements. The harvests occurring in District 5 and Canada are apportioned entirely to the upper run stock based on geographical location of the harvest. Harvests occurring in District 6 are apportioned to the middle run stock also based on geography.

The new analytical program, previously described in this section last year, has substantially reduced the amount of time constructing and analyzing data. The control file documents data input and the output file is easily imported into excel for summarizing. All the historical data back to 1981 have now been re-processed using the new methodology. This information has been presented in the comprehensive Regional Information Report No. 3A00-25 (Lingnau,

T.L. 2000. *Origins of Chinook Salmon in the Yukon River Fisheries, Revised Edition, 1981-1996 Alaska Department of Fish and Game, Commercial Fisheries Division, AYK Region, Anchorage)*. This report is now the new reference for the historical database concerning stock identification of Yukon River chinook salmon using analysis of scale patterns. The following table outlines the contribution of each run, Lower, Middle and Total Upper, to the combined total, drainage-wide harvest. Proportions under the "United States Upper" and "Canada Upper" column headings refer to the portion of the contribution of the Total Upper Run harvest attributed to the Alaskan and Canadian harvest, respectively. All Lower and Middle Run fish are harvested in the Alaskan fisheries.

Year	Lower [a]	Middle [b]	United States Upper [c]	Canada Upper [c]	Total Upper [c]
1981	0.054	0.545	0.313	0.088	0.401
1982	0.139	0.247	0.513	0.101	0.614
1983	0.129	0.337	0.446	0.087	0.533
1984	0.253	0.402	0.251	0.094	0.345
1985	0.276	0.223	0.409	0.092	0.501
1986	0.195	0.096	0.587	0.122	0.709
1987	0.159	0.196	0.559	0.086	0.645
1988	0.218	0.158	0.498	0.126	0.625
1989	0.244	0.159	0.494	0.102	0.597
1990	0.202	0.252	0.433	0.114	0.547
1991	0.280	0.253	0.349	0.118	0.467
1992	0.163	0.218	0.523	0.096	0.619
1993	0.215	0.254	0.439	0.092	0.531
1994	0.182	0.214	0.494	0.110	0.604
1995	0.160	0.236	0.499	0.105	0.604
1996	0.210	0.104	0.562	0.124	0.686
1997	0.264	0.168	0.482	0.086	0.568
1998	0.327	0.174	0.442	0.056	0.498
1982-1998 Average	0.199	0.241	0.460	0.100	0.560

[a] The Lower River stock group includes Koyukuk River stocks downstream from and including the Gisasa River, and those stocks spawning downstream from the Koyukuk River.

[b] The Middle River stock group includes all Tanana River stocks, all Koyukuk River stocks upstream from the Gisasa River, and those stocks spawning between the Koyukuk and Tanana Rivers.

[c] The Upper River stock group includes all Yukon River stocks spawning upstream from the Tanana River confluence.

The portion of the total Alaskan catch of Yukon River chinook salmon attributed to lower, middle, and upper river stock groups from 1981 through 1998 is shown in the table that follows.

Year	Lower	Middle	Upper
1981	0.059	0.598	0.343
1982	0.154	0.275	0.571
1983	0.142	0.370	0.489
1984	0.280	0.443	0.277
1985	0.304	0.246	0.451
1986	0.223	0.109	0.668
1987	0.174	0.214	0.612
1988	0.249	0.181	0.570
1989	0.272	0.177	0.551
1990	0.228	0.284	0.488
1991	0.318	0.287	0.395
1992	0.180	0.242	0.578
1993	0.237	0.280	0.483
1994	0.204	0.241	0.555
1995	0.179	0.264	0.557
1996	0.240	0.118	0.642
1997	0.289	0.184	0.527
1998	0.347	0.185	0.468
1982-1998 Average	0.237	0.241	0.523

Similarly, the portion of the total harvest of upper river stock group origin chinook salmon caught in Alaskan and Canadian fisheries from 1981 through 1998 is shown in the table below.

Year	Alaska	Canada
1981	0.781	0.219
1982	0.835	0.165
1983	0.837	0.163
1984	0.727	0.273
1985	0.816	0.184
1986	0.827	0.173
1987	0.867	0.133
1988	0.798	0.202
1989	0.829	0.171
1990	0.792	0.208
1991	0.748	0.252
1992	0.845	0.155
1993	0.826	0.174
1994	0.818	0.182
1995	0.826	0.174
1996	0.819	0.181
1997	0.848	0.152
1998	0.888	0.112
1982-1998 Average	0.820	0.180

Data for 1999 is still being processed.

During 2000, stock standards for the lower river run of origin, escapement samples of chinook salmon were collected from the Andreafsky, Anvik and Gisasa Rivers. Middle river stock standards were obtained from chinook salmon escapements to the Chena, Goodpastor, Chatanika and Salcha Rivers within the Tanana River drainage. The Canada Department of Fisheries and Oceans in Whitehorse collected scale samples from fishwheels used in an escapement-tagging project. Scales from these escapement projects and commercial harvests are in the process of being aged. Scale pattern analysis for 2000 will begin once the chinook salmon scales have been aged.

6.1.2 Yukon River Sonar

The goal of the Yukon River sonar project at Pilot Station is to estimate the daily upstream passage of chinook and chum salmon. The project has been conducted since 1986. Sonar equipment is used to estimate total fish passage, and drift gill netting with a variety of mesh sizes is used to estimate species composition. Prior to 1992, we used sonar equipment, which operated

at 420 kHz. In 1993, we changed the existing sonar equipment to operate at a frequency of 120 kHz to allow greater ensonification range and to minimize signal loss. The newly configured equipment's performance was verified using standard acoustic targets in the field in 1993. Use of lower frequency equipment increased our ability to detect fish at long range.

Prior to 1994, we attempted to classify detected targets as to direction of travel by aiming the acoustic beam at an upstream or downstream angle relative to fish travel. This technique was discontinued in 1995 to enhance target detection. Significant enhancements in 1995 included further refinements to the species apportionment process and implementing an aiming strategy designed to consistently maximize fish detection. Because of these recent changes in methodology, data from 1995, 1997, 1998, 1999 and 2000 are not directly comparable to any previous project data.

Salmon passage estimates at Pilot Station are based upon a sampling design in which sonar equipment is operated in 3-hour intervals, three times each day. In 2000, the sonar equipment was operated 24-hours per day on five occasions. Passage estimates during these expanded operations differed from typical 9-hour passage estimates by 5% on average.

Gill nets with mesh sizes ranging from 7.0 cm to 21.6 cm (2.75 in to 8.5 in) were drifted through the sonar sampling areas twice daily, between sonar data collection periods. Drift gill netting resulted in the harvest of 8,755 fish during 2,332 drifts including 508 chinook salmon, 2,817 summer chum salmon, 1,295 fall chum salmon, 2,000 coho salmon, and 2,135 other species. The region behind and directly in front of the transducer was tested for target species by controlling one end of a gill net from the boat and the opposite end from shore using a 5.25" mesh during the early season and 5.75" mesh during the fall season. Captured fish were distributed to nearby residents daily.

The sonar project was operational from June 9 through September 15 in 2000. Range-dependent signal loss occurred sporadically during the season, which we believe was caused by the river's variable sediment load. We were able to compensate for signal loss through a combination of changes in the echo sounder transmit levels, gain settings and absorption compensation. Occasional sonar periods were missed when large waves crested over the tops of the transducers and caused the signal to fade or in severe cases to disappear entirely. These periods of wave action did not affect data during an entire day and rarely affected an entire sonar-sampling period. Water levels and the amount of debris in the river were exceptionally high in 2000. As a result some sonar periods were missed because of large logs drifting close to the banks and, in some cases, knocking over sonar equipment.

Preliminary passage estimates for 2000 and final passage estimates for 1999, 1998, 1997, and 1995 are listed in the table below. Estimates for 2000 are not comparable to previous years because of a change in species apportionment software. Previous year's estimates will be revised to reflect these changes.

Species	2000 Estimated Passage	2000 Lower 90% Confidence Intervals	2000 Upper 90% Confidence Intervals	1999 Estimated Passage	1998 Estimated Passage	1997 Estimated Passage	1995 Estimat Passage
Large Chinook Salmon*	61,055	53,073	69,037	183,094	83,175	133,691	203,282
Small Chinook Salmon	9,057	6,494	11,620	28,036	38,871	90,399	36,938
Total Chinook Salmon	70,112	61,729	78,495	211,130	122,046	224,090	240,220
Summer Chum Salmon	410,528	391,846	429,210	945,894	830,633	1,411,233	3,638,180
Fall Chum Salmon	253,512	237,339	269,685	507,598	397,157	623,367	1,247,540
Total Chum Salmon	664,040			1,453,492	1,227,790	2,034,600	4,885,720
Coho Salmon**	183,192	168,677	197,707	94,446	176,792	153,502	154,464
Other Species***	387,339			259,971	241,627	273,165	594,335
TOTAL	1,304,683			2,019,039	1,768,255	2,685,357	5,874,739

*Chinook Salmon >655 mm for 1999& 2000, >700mm for 1995-1998.
**This estimate may not include the entire run.
***Includes Pink Salmon, Cisco, Whitefish, Sheefish, Burbot, Suckers, Dolly Varden, Sockeye Salmon, and Northern Pike.

6.1.3 Tanana River Fall Chum Salmon Tagging

A cooperative fall chum salmon stock assessment project by ADF&G and BSFA was initiated in 1995 on the Tanana River and operated annually through 2000. The primary objective was to estimate the abundance of fall chum salmon in the upper Tanana River (upstream of the Kantishna River) using mark-recapture techniques. Secondary objectives were to estimate the migration rates of fall chum salmon within the Tanana River and determine the timing of selected stocks (e.g., the Delta River) as they passed the tagging site. As a result of the disastrous salmon runs to Western Alaska in 1997 and 1998, the Tanana River tagging study was expanded in 1999 with federal disaster-relief funding to include the Kantishna River fall chum salmon run component.

A single fish wheel was operated in the Tanana River approximately 8 km above the mouth of the Kantishna River to capture chum salmon for tagging. A second tagging wheel was operated in the Kantishna River approximately 8 km upstream from its terminus on the Tanana River. Each tagging wheel was equipped with a live box and a four-person crew deployed tags during a 12-hour daily schedule at each wheel. Chum salmon were tagged with individually numbered spaghetti tags, and each tagged fish had its right pelvic fin clipped as a secondary mark. A total of 1,922 chum salmon were tagged and released from the Tanana River wheel between August

18 and September 29, while a total of 970 chum salmon were tagged and released from the Kantishna tagging wheel during the same approximate period.

Four live-box equipped fish wheels were used to recapture tagged fish. A single recovery wheel operated approximately 60-70 km upstream of the Tanana River tagging wheel to recapture tagged fish bound for the upper Tanana River. Two recovery wheels were fished on opposite sides of the Toklat River approximately 15 km upstream from its terminus on the Kantishna River to recapture tagged fish released from the Kantishna River tagging wheel. In addition, the National Park Service funded (from pass through funds from USFWS) a recovery wheel in the upper Kantishna River and was operated for the first time in 2000. All recovery wheels fished 24-hours per day. A total of 45 tags were recovered from 1,199 chum salmon examined in the upper Tanana River recovery wheel during the period August 18 through October 2. In the Toklat recovery wheels, a total of 35 tags were recovered from 822 chum salmon examined. In the upper Kantishna recovery wheel, a total of 11 tags were recovered from 305 chum salmon examined. Tag recoveries on chum salmon are also being made from spawning ground surveys currently under way to provide stock-specific run-timing information where possible.

A preliminary Bailey estimate of the total number of fall chum salmon passing the Tanana River tagging site through October 3 2000, bound for the upper river, was approximately 47,635 (SE = 6,814). The preliminary estimate for the Kantishna River run component through September 28 was 21,104 (SE = 3,393) fall chum salmon.

6.1.4 Lower Yukon River Chum Salmon Genetic Sampling

All chum salmon entering the Yukon River after July 15 are considered fall run for purposes of in-season management. During the summer of 1999, ADF&G genetics began a three-year study to determine the variation in entry timing of summer run and fall run chum salmon. Genetic stock identification (GSI) methods developed by USFWS, BRD, and ADF&G using allozyme loci can accurately and precisely discriminate summer- and fall-run chum salmon. Use of genetic markers to estimate timing of entry and run-timing patterns will provide a better understanding of the nature and variability of these stock characteristics.

Chum salmon entering the Yukon River were sampled from July 5 to August 2 at the ADF&G sonar site at Pilot Station. Fish were sampled from species apportionment sampling conducted twice daily at the sonar site. Gillnets are drifted in the morning and in the evening using a variety of mesh sizes off both the right and left bank. As chum salmon were picked from the gill nets; they were fin-clipped to keep track of bank orientation. After gillnet drifts were completed for a given sampling period (morning or evening), up to 30 chum salmon were randomly sampled from the total number of fish. Muscle, liver, and heart tissues were dissected from each fish, placed in labeled cryovials, and frozen on liquid nitrogen. Data recorded were date, bank orientation, and period. Samples were periodically shipped to the ADF&G-Genetics Laboratory in Anchorage.

During 2000, 969 chum salmon were sampled for GSI. Four stock composition estimates will be made on approximately 200 fish for the time periods July 5-11, July 12-18, July 19-25, and July 26 – August 2. The chum salmon to be used in the stock composition analysis will be randomly selected from the total sampled for a given weekly time period, proportional to the daily passage rate and bank orientation.

The Genetics Laboratory will begin running these samples in October; a progress report on the first year of this study will be prepared in early 2001.

6.1.5 Upper Yukon River Chum Salmon Genetic Sampling

The genetics laboratory for fish is currently conducting analyses to test the performance of a new genetic baseline for Yukon River chum salmon. The baseline consists of data from two classes of DNA markers, microsatellites and SINEs, for eight fall chum salmon and two summer chum salmon run populations. Simulations will be conducted to evaluate the baseline's theoretical performance, plus the baseline will be used to estimate stock composition of mixed stock collections from the Ramparts tagging project conducted by the Service's Fairbanks Fishery Resources Office. Theoretical performance of the DNA baseline will be compared with discrimination obtained from allozyme (protein) data. In addition, the Fish Genetics Laboratory is supporting a graduate student to identify additional DNA methods and classes of genetic markers suitable for stock identification of Yukon River chum salmon. This work is expected to expand the range of genetic tools available for fisheries applications. Results of the baseline testing will be coming out by next spring. The outcome of this work will help chart the course for future baseline development and applications.

6.1.6 Yukon River Chum Salmon Ecology Studies

As requested by the U.S. Fish and Wildlife Service, the U.S. Geological Survey, Alaska Biological Science Center initiated a study in 1996 to identify factors affecting or controlling the abundance of Yukon River chum salmon. Our study is focused on the freshwater portion of the chum salmon's lifecycle. In general, the purpose of the study is to estimate production in terms of numbers of smolts per spawner. Nested within this estimate are estimates of egg deposition per spawner, survival from egg deposition to alevin (pre-emergent sac-bearing fry), from alevins to emergence, and from emergence to smolt emigration. Estimates of eggs/spawner can be done at two levels. The first level is potential egg depositions (PED), which refers to the total number of eggs arriving at the spawning site regardless of whether they are successfully fertilized or deposited in the gravel. Actual egg deposition (AED) refers to the numbers of eggs that are successfully deposited into the gravel. Survival estimates for each of these shorter life stages will be informative and when evaluated in light of the overall smolt production per spawner, should reveal production bottlenecks. In addition, an important facet of our research is to determine the effects of environmental conditions (e.g., water/intra-gravel temperatures and flow) on the survival of chum salmon at critical life stages. These analyses may reveal controlling factors and mechanisms that ultimately could be used in predictive models assessing the effects of management and rehabilitation strategies.

Our overall study objectives include:

1) estimating spawner abundance,
2) estimating the duration and distribution of spawners in the spawning area,
3) quantifying spawning habitat,
4) estimating over-winter survival rates of eggs and fry in the gravel,
5) determining what factors influence freshwater survival.

Because of the extreme size of the Yukon River watershed and remoteness of most tributaries, our original proposal included four representative chum salmon stocks, two summer-run (Chena and Salcha rivers) and two fall-run (Toklat River and Bluff Cabin Slough in the Tanana River). These four chum salmon stocks were selected because 1) they were thought to be representative of other Yukon River tributary stocks, 2) they are relatively accessible, and 3) in the case of the Toklat in particular, there have been concerns about possible population declines. After the initial year (1996 and early 1997) of exploratory surveys, however, funding and logistical constraints have forced us to limit work to two study sites (Hodgin's Slough, Chena River and Bluff Cabin Slough, Tanana River). During 2000, our efforts where again primarily on continuation of our work on the Chena River and Tanana River sites.

A progress report detailing our results for the 1996 and 1997 brood years was released on November 1998. We are currently working on a progress report for the inclusion of brood year 1998 and 1999 data, and are compiling and collecting 2000 data.

One of the main focuses to date at the two study sites has been to refine and standardize methodologies. Habitat mapping using surveying equipment has allowed us to develop detailed computer-based maps of the study sites and spawner distributions. Adult fish were enumerated at weirs. Intra-gravel survival and density estimations were attempted using a hydraulic pump and smolt emigration using funnel traps and mark-recapture technique. Using a fecundity/length relationship, we have been able to estimate potential egg deposition (PED). However, our attempts to estimate AED eggs within the study sites using redd pump sampling have not been tenable. Although, estimates where made during the fall of 1997, the confidence intervals around these estimates are essentially ± the estimate. During the fall of 1998 we used an Adaptive Sampling design in an attempt to improve AED estimates. Although the estimates done on small sample plots had improved precision, it was apparent that an unacceptable level of destructive sampling was needed to achieve this improvement (i.e., approximately 30 to 40% of the spawning area would have been sampled).

In the Hodgin's Slough the number of females spawning within the study site have decreased each year (174 in 1997, 146 in 1998, and 114 in 1999). Unfortunately, during 2000, enumeration of spawning females was not possible as extreme flooding occurred on August 13, just prior to peak spawning. During 1997 through 1999 more than 90% of spawning occurred prior to 30 August. At spawning sites (redds) of spawning females, individual locations were mapped and characterized (in terms of water depth and velocity and substrate type). Initial estimates of smolt originating with the study are 55,000 for brood year 1997 and 27,000 for brood year 1998. Smolt emigration estimates for the 1999 brood year were not possible because

of severe spring flooding during 2000. Using the preliminary smolt estimate, the survival from PED to smolt emigration was about 15% for 1997 and 8% for 1998 brood years.

The number of female chum using the Bluff Cabin Slough study site has varied greatly (107 in 1997, 6 in 1998, and 143 in 1999). Initial estimates of smolts originating with the study are 12,500 for 1997, <300 for the 1998 and 27,900 for the 1999 brood years. The 1998 estimate is partial, because of suspended operations on May 17 due of safety considerations. Using the preliminary smolt estimates, the survival from PED to smolt emigration were about 4.5% for 1997, 2% for 1998 and 10.5% for 1999 brood years.

Because of problems encountered in estimating viable egg and alevins numbers in the gravel, a sub-study entitled "Quantification of upwelling as a determinant of spawning site selection and quality for Yukon River chum salmon" was initiated and funded in 1999 under the USGS quick response program. During 1999, mini-piezometers (stand pipes) were systematically deployed along transects in both summer-run and fall-run chum salmon spawning areas. These piezometers allow us to measure the hydraulic pressure differential between subsurface and surface waters (VHG), substrate permeability, and subsurface water velocity. In addition, dissolved oxygen (DO), conductivity and temperature were measured and monitored within each piezometer. At each study site, piezometers are installed in a geo-referenced (Universal Transverse Mercator (UTM) coordinates) grid pattern along 11 transects, for a total of 44 piezometers at the Chena R. and 48 piezometers at the Tanana R. study sites. To date, hydraulic and water quality measurements have been collected during July 25 - 26, September 2-3, January 21- 23, and March 4 1999-2000 at Hodgin's Slough. Bluff Cabin Slough intra-gravel measurements have been taken September 23-24, January 26, and February 26 1999-2000

Measurements in Hodgin's Slough showed large variation in hydraulic variables, temperature, and DO. Relatively distinct patterns were evident for temperature, DO and VHG. In contrast, measurements taken in the Bluff Cabin Slough study site indicated a more homogenous environment with the exception of VHG, which appeared patchy. We are performing measurements and analyses for the calculation of permeability and intra-gravel water velocity estimates. Temperature and DO appear to match observed spawning distributions best at the Hodgins Slough study site. In areas of high spawner densities, intra-gravel late July temperatures where higher (7 to 9.5° C) and D.O was slightly higher (4 to 5.5 mg/l) than in areas of little and no observed spawning where temperatures were 3 to 6° C and D.O. was <2 to 4 mg/l. In general, during winter the temperatures in the spawning areas were lower (0.5 to 2° C) than in non-spawning areas (1 to >2° C). However, D.O. was distinctly higher (>6 to 7.5 mg/l) in spawning areas than in non-spawning areas (>1 to 6 mg/l). In the Bluff Cabin Slough study site, temperatures varied little between September (3.1 - 4.4° C) and January (3.1 - 4.4° C). D.O. also showed little variation between fall and winter sampling, 10.3 - 12.0 mg/l as compared to 9.5 - 11.0 mg/l.

Survival of eggs and alevins is being evaluated using *in situ* incubation baskets. At each study site the eggs from three females were pooled and fertilized using three males. Eggs were

counted into groups of 100 and each group placed into an incubation basket with sieved gravel. Incubation baskets were buried in clusters of three associated with individual piezometers. A total of 48 (16 clusters of three) and 42 (14 clusters of three) incubation baskets have been placed in the Hodgin's Slough and Bluff Cabin Slough study sites. Deployment of incubation basket groups was determined after collecting initial hydraulic and water quality measurements. The overall study design is to examine one basket from each group at the eyed-egg stage and one at the pre-emergent stage, while the third basket will remain in the gravel until emergence (Spring, 2000). Egg baskets (eyed-egg and pre-emergent stages) are examined, and individual eggs, alevins (yolk sac-bearing fry), and fry are enumerated and classified in the field as live or dead.

At the Hodgin's Slough study site, survival rates in spawning areas were 63 - 94% at the eyed-egg stage and 26 - 91% at the pre-emergent stage. All but 4 of the 11 baskets in spawning areas were damaged during spring flooding. in those 3 baskets survival until emergence was 40 - 98%. In non-spawning areas, baskets were buried in silt, and survival to emergence was 0%. In the Bluff Cabin Slough study site survival until the eyed-egg stage ranged from 40 to 100%. Ignoring the two lowest basket survivals (40 and 63%), survival in the remaining 12 baskets was very high (87 - 100%). Pre-emergent survival was extremely low in the Bluff Cabin study site baskets (0 - 33%). Indeed, live alevins were only found in 2 baskets (2% and 33% survival). It appeared that the baskets in Bluff Cabin Slough had become heavily silted. Without further work and analyses, any application of these survival rates to natural survival rates is not warranted. It was not possible to repeat the egg-basket experiment in the Hodgin's Slough study site during 2000 due to extremely high water and work at the Bluff Cabin Slough site is ongoing.

The techniques employed are believed to providing a quick and relatively inexpensive means to quantify the subsurface environment in remote salmon spawning areas. Measurements from the study sites will begin to describe factors influencing chum salmon spawning site selection and the subsequent survival of incubating eggs and alevins.

USGS personnel, in cooperation with BLM personnel, did a reconnaissance survey of Clear Creek, a tributary of the Hogatza River during September 2000. If adequate funding is available we will begin cooperative pilot work with BLM on Clear Creek during 2001 to assess the possibility of monitoring smolt emigrations and spawning habitat.

6.1.7 Yukon River Chinook Salmon Tagging and Telemetry Study

A chinook salmon radio telemetry program was initiated in the Yukon River basin in 2000 by ADF&G and NMFS to provide information on run characteristics - including stock composition, run timing and migration patterns. The primary objectives during 2000 were to develop effective fish capture techniques and refine radio-tracking methods in the lower Yukon River main stem. The USFWS, BLM, DFO CANADA, and BSFA also provided support for the study.

Adult chinook salmon migrating upriver were captured with drift gill nets at two sites in the lower river near the villages of Marshall and Russian Mission from early June until mid July. Local fishermen were contracted as boat captains. Three different mesh sizes (6.5", 7.5" and 8.5") hung at both 3:1 and 2:1 hang ratios were used. The length of net fished ranged from 35 m to 45 m. The nets were monitored continually, and fish removed immediately upon capture. The fish were placed in a tagging cradle submerged in a trough of fresh water. Anesthesia was not used during the tagging procedure. Most fish were tagged with blue spaghetti tags attached below the dorsal fin. Selected fish were tagged with pulse-coded radio transmitters inserted through the mouth and placed in the stomach; these fish were tagged externally with yellow spaghetti tags. All fish were given secondary marks consisting of a left-sided operculum hole punch and removal of an axillary fin. Scale samples were taken, and information on sex, body length, and general condition recorded.

Drift gill nets were effective in capturing chinook salmon in the lower river with 761 fish captured during the study. A total of 581 fish were marked with blue spaghetti tags, including 359 fish at Marshall and 222 fish at Russian Mission. Ninety-one fish were radio-tagged, including 27 fish at Marshall and 64 fish at Russian Mission. Eighty of these fish were tracked upriver; the other 11 fish were tagged with equipment from a second vendor for a comparison test at the tagging site.

Radio-tagged fish migrating upriver were recorded by remote tracking stations located at Russian Mission, and four upriver sites on important travel corridors and spawning tributaries: the lower Koyukuk River, lower Tanana River, Chena River and the Yukon River main stem near the Rampart Rapids. Aerial and boat surveys were conducted in the lower river to determine movement patterns immediately after release, however, tracking success was severely limited apparently due to the fish traveling at relatively deep depths. Control tests conducted at the tagging site indicated that transmitters at depths greater than 10 m were difficult to detect. Two vendors are working to develop more powerful transmitters, and control tests will be conducted this fall in Juneau.

Chinook responded well to the tagging. Voluntary spaghetti tag returns totaled 125, with an additional 34 tags collected during random sampling activities that examined 7,766 fish upstream of Russian Mission. This information will be evaluated to determine the feasibility of developing abundance estimates. Radio-tagged fish typically resumed upriver movements within the first several hours. Fish tagged at Russian Mission and detected by tracking stations at the site (n=21) passed upriver an average of 19 h after release.

Thirty-seven (70%) fish radio tagged at Russian Mission moved upriver and were recovered in fisheries or recorded by tracking stations in the upper basin. Only 52% of the fish tagged at the Marshall site were observed upriver. However, difference in handling procedures may account for this discrepancy. Six of the seven Marshall fish recovered in upriver fisheries had regurgitated their tags, suggesting that some of the fish not located upriver may have experienced a similar fate. None of the Russian Mission fish caught in upriver fisheries exhibited this problem. Twenty-eight fish tagged at Russian Mission traveled to areas in the upper basin, 15 (54%) to the Tanana River and 13 (46%) upriver from the Rampart Rapids.

Movement rates for these fish averaged 51.3 km/d (32 mi/d); the fastest rate observed was 67 km/d (42 mi/d) for a fish destined for the Tanana River. These results were comparable to movement rates observed for chinook salmon radio tagged at the Rampart Rapids in 1998. Travel time averaged 17 d for fish passing the lower Tanana River and 16 d for fish moving through the Rapids. No fish were recorded passing the stations on the Koyukuk River. However, this stock appears to have moved past the tagging sites in early July when radio-tagging operations were ending. Eight of the ten spaghetti-tagged fish recovered at the Gisasa River weir (lower Koyukuk drainage) were tagged after July 2. It is not known what proportion of the unaccounted radio-tagged fish moved into other areas of the drainage not covered by tracking stations.

Other activities were conducted during 2000 in preparation for expanded telemetry work in subsequent years. Additional tracking stations site were identified on the Yukon River main stem, Innoko, Bonasila, Anvik, Koyukuk and Hogatza Rivers. Several sites were cleared to facilitate station installation in 2001. Preliminary surveys were also conducted on the Melozitna, Nowitna and Tozitna Rivers to locate potential station sites in these tributaries. Work is progressing to expand the automated database-GIS mapping system, developed to summarize and present salmon telemetry data in the upper basin, to encompass the lower and middle sections of the drainage. Plans are to have the system, including an inter-active Internet web site, on line for the 2001 field season.

6.1.8 Upper Yukon Fall Chum Salmon Tagging Study

The Rampart Rapids tagging study was operational for approximately three weeks July 31 to August 20, 2000. The early termination of the project was due to concerns related to potential handling mortality and the overall low abundance throughout the Yukon River drainage. A total abundance estimate for three weeks sampled was 45,021 (SE=2,839) fall chum salmon was based on 4,219 tagged fish and 246 recaptured fish. Weekly abundance estimates, standard error of the estimates, capture probability (P) and standard error of P were as follows:

Date	Estimate	S.E.	P	SE of P
Jul 31 - Aug 6	9,302	1,245	0.104	0.014
Aug. 7 - 12	12,492	1,621	0.129	0.017
Aug. 13 - 19	23,226	2,620	0.071	0.008

Steps to reduce the number of fish handled were extended at the marking and recapture sites. At the marking site the north side fish wheel was modified and plastic mesh was laid in the bed of the baskets. Fishing time was minimized and more time was spent at the fish wheel to catch and tag fish directly out of the live box chute so the fish could be tagged without holding. Mean holding time in the live box at the marking site between 1996 and 2000 have been 8.1, 4.3, 2.9, 1.7, and 1.0 hours, respectively. Further improvements may not be reflected because wheel start times do not reflect holding time for fish caught and tagged as they are captured. High catch rates due to high water effects aided in our ability to reduce holding times. At the

recapture site, only one wheel was contracted for recapture, which also reduced the number of fish handled.

6.1.9 Restoration and Enhancement Fund Projects

The Yukon River Restoration and Enhancement Fund (Fund) was established in 1995 as part of the Interim Agreement between Canada and the United States for the purposes of seeking to ensure the effective conservation and management of Yukon River salmon. In the past, the USFWS transferred an annual Fund contribution to the Yukon River Panel for administration under the terms of the Interim Agreement. However, because the Interim Agreement expired in the spring of 1998, the USFWS became responsible for Fund administration. Desiring to continue using the Fund for Yukon River salmon restoration and enhancement activities, the Fund was distributed in Alaska during 2000, via a competitive proposal process similar to but abbreviated from previous years. Additionally, as a show of "good faith", the U.S. negotiating section authorized the transfer of $215,000 for restoration and enhancement projects in the Yukon Territory, Canada at the April negotiation meeting in Fairbanks.

In December 1999, the USFWS sent over 100 letters to tribal councils, village governments, Native corporations and private individuals and an advertisement was run in the Fairbanks Daily News-Miner requesting proposals to conduct Yukon River salmon research or assist in management activities. Fifteen proposals were received and technically reviewed by the U.S. Section of the JTC Restoration and Enhancement Subcommittee. All 15 proposals were technically evaluated between January 15 to February 29, 2000. Proposal evaluations were forwarded on March 2, 2000 to the funding selection committee. The funding selection committee met on March 16, 2000 and awarded funding to 11 project applications. The table which follows lists the projects or activities funded for 2000. The field portions of ten projects are complete as of October 1 and final reports for all projects are due at various times over the next several months.

Yukon River Salmon Restoration and Enhancement Fund 2000
Accepted Proposals by the Selection Committee

Proposal #	Title	Applicant	$ Amount
RE-01-2000	Evaluation of the effects of *Ichthyophonus* on survival and reproductive success of Yukon River Chinook salmon	Richard Kocan, Paul Hershberger, and Bill Fliris	$25,000.00
RE-02-2000	Stored video images as an alternative to fishwheel live boxes for the collection fall chum catch per unit effort	Stan Zuray, Tanana	$6,350.00
RE-03-2000	Stored video images as an alternative to fishwheel live boxes for the collection chinook salmon catch per unit effort	Stan Zuray, Tanana	$10,025.00
RE-04-2000	Kaltag drift gillnet salmon test fishery, 2000	City of Kaltag	$22,450.00
RE-05-2000	Marshall summer season driftnet test fishery	AVCP Bethel, AK	$15,420.00
RE-06-2000	Mountain Village fall season gillnet test fishery and Tanana Village area fall season fishwheel test fishery	BSFA Anchorage, AK	$26,540.00
RE-07-2000	Installation and operation of video equipment on the subdistrict 5-A test fishwheel	Bill Fliris, Tanana, AK	$9,370.00
RE-08-2000	Middle Yukon River chinook salmon sampling project, 2000	City of Kaltag	$1,225.00
RE-10-2000	Estimating freshwater survival and environmental influence on survival for several Yukon River chum salmon stocks	Jim Finn USGS/BRD	$49,000.00
RE-12-2000	Salcha River chinook and chum salmon chum tower, 2000 operations	BSFA Anchorage, AK	$53,714.20
RE-13-2000	Chena River chinook and chum salmon chum tower, 2000 operations	BSFA Anchorage, AK	$9,173.00
		Total =	$228,267.20

6.2 Canada

In addition to projects operated and funded by federal and territorial agencies, several fishery-related projects were conducted by local organizations within the Yukon River drainage. A list of all projects conducted within the Canadian portion of the Yukon River drainage, including project location, objectives, and responsible agencies or organizations, is provided in Table 6. Available results from most projects are incorporated in the fishery and stock status portions of this report. Historic project results can be found in the attached database tables and figures. Only new projects, or projects of particular interest, are presented in detail here. These specific projects are: (1) Upper Yukon River Tagging Program (Yukon Territory), DFO; (2) Harvest Sampling, DFO and LGL; (3) Whitehorse Rapids Fishway Chinook Enumeration, YFGA; (4) Whitehorse Hatchery Operations, DFO; (5) Fishing Branch River Chum Salmon Weir, DFO; (6) The Importance of Small Streams as Salmon Habitat in the Upper Yukon River Basin; (7) Restoration and Enhancement Fund Projects and (8) Habitat Restoration And Salmon Enhancement Program (HRSEP) and Community Development and Education Program (CDEP).

6.2.1 Upper Yukon River Salmon Tagging Program (Yukon Territory)

Department of Fisheries and Oceans, Canada has conducted a tagging program on salmon stocks in the Canadian section of the upper Yukon River drainage since 1982 (excluding 1984). The objectives of this program are to provide inseason estimates of the border passage of chinook and chum salmon for management purposes and to provide post season estimates of the total spawning escapements, harvest rates, migration rates and run timing. Spaghetti tags are applied to salmon live-captured in the fish wheels. Tagging events are twice daily, morning and evening. Subsequent tag recoveries are made in the different fisheries located upstream, and infrequently in those located downstream. Population estimates are usually developed using spaghetti tag recoveries from the Canadian commercial fishery located downstream from the Stewart River where the most intensive catch monitoring is conducted. In this area, commercial fishers are legally required to report catches and deposit tags and associated data in drop-off boxes at the Fortymile River or in Dawson City within eight hours of the closure of each fishery.

Consistency in the fishwheel sites and fishing methods permits some inter-annual and in-season comparisons, although the primary purpose of the fishwheels is to live-capture salmon for the mark-recapture program. Catch data is used cautiously when assessing abundance, particularly for chinook salmon, since there is limited correlation with mark-recapture estimates of border escapement.

The two fishwheels, White Rock and Sheep Rock, are situated approximately seven kilometers apart on the north bank of the river. With the exception of short periods for maintenance or repair in 2000, the fishwheels ran 24 hours per day for a cumulative operating period from June 23 to October 6 for the White Rock wheel and from June 27 to October 4 for the Sheep Rock fish wheel.

Chinook Salmon

The first chinook salmon was caught in the upstream fishwheel, Sheep Rock on July 4. The average date of the first chinook capture for the 1990 to 1999 period is June 28. The run as observed at the DFO fishwheels exhibited average timing. A peak daily wheel catch of 203 chinook salmon was recorded on July 25. This is similar to the recent ten-year average daily peak count date of July 21, although the date of peak counts for the 1990 to 1999 period have ranged from July 5 to August 6.

The combined total fishwheel catch of chinook salmon in 2000 was 1,471 fish, 93.8% of the recent cycle average of 1,569. The sex composition as observed in the fishwheel catches was 27.9% female.

The preliminary 2000 chinook salmon border escapement estimate is 17,215 fish (the 95% confidence interval for the initial estimate (16,236) unexpanded for wheel timing was 12,581 to 20,931 fish). Subtracting the harvest of 4,625 fish, 12,590 chinook salmon were estimated to have reached the various spawning grounds. This estimate is 45% of the 2000 escapement goal of >28,000 chinook salmon and is 47.6% of the recent cycle average of 26,463 fish.

Comparative border and spawning escapement estimates from the tagging program for 1982 through 2000 are presented in Attachment I.

Chum Salmon

The first chum salmon was captured at the White Rock fish wheel on July 26. On average over the previous ten years, the first chum salmon has been captured July 22. The mid-point of the run occurred on September 13. The mid-point dates over the previous ten years average at September 14, however the mid-point dates have been quite variable, ranging from September 5 to September 23. The peak catch of 284 chum salmon occurred on September 13. On average the daily catch peaks on September 17, although, as with run-mid point dates, peak count dates have been quite variable, and the dates for the 1990 to 1999 period range from September 5 to 27. The total catch was 5,451 chum salmon. This is 52.6% higher than the 1990 to 1999 average of 3,571 chum salmon.

A number of green spaghetti tags applied at Rampart, Alaska were observed on chum salmon captured by the fish wheels and many of these tags were recovered in the one day commercial opening and by aboriginal fishers. The U.S. tags captured in the DFO fish wheels will be incorporated in the final mark-recapture estimate when tag application and recovery information is finalized.

In 2000, 3,702 of 5,451 chum salmon captured in the DFO fish wheels were tagged. High daily fish wheel catches were recorded from September 5 –15; daily catches for the September 8-16 period exceeded 200 fish per day. The high daily catches resulted in a concern that that there would not have enough tags to last the season. For this reason as well as concern about crowding

the fish and exposing the fish to a long holding period in the live pens, the tagging procedure was modified. All fish captured in the morning check were released untagged and tagging took place in the afternoon and as late as possible in the evening. This approach was initiated on September 12 (statistical week 37) and was continued until the end of the program. Within this period, 3,074 fish were caught of which 45.2% (1,389) were tagged.

Run size information obtained from the U.S. Pilot Station Sonar project and test fisheries, indicated that there was a very poor fall chum run in Year 2000. This information led to a decision to use the relationship between historic fish wheel catches and the border escapement, rather than initiate a test fishery or commercial fishery for tag recovery information; these fisheries usually provide the catch and tag information required for weekly in-season border escapement estimates. However, it soon became apparent that the fall chum salmon run entering the upper Yukon River drainage was much higher than predicted or the border escapement estimates derived from the relationship between fish wheel catches historic border escapement were not indicative of abundance of the 2000 run. For example, forecasts made in statistical weeks 35 and 36 predicted total season border escapement ranges of 93,700 to 116,700 and 112,200 to 131,500, respectively. These forecasted escapement levels were sufficiently high enough for achieving the 80,000 escapement target and permitting a harvest of the surplus. A 24-hour commercial fishery was initiated to determine if the border escapement projections were an artifact of high water conditions or due to actual abundance. This fishery was conducted from noon September 15 to noon September 16 and 1,319 chum salmon were harvested. The run forecast information derived from this fishery indicated that the wheel information was erroneously predicting border escapement and that an optimistic estimate of the total season border escapement was 71,000 to 80,000[1], below the escapement goal. This information was presented to the Yukon Salmon Committee and a decision was made that no additional fisheries would be initiated until forecast information indicated that the escapement goal would be exceeded.

The catch and tag recovery component of the mark-recapture study for chum salmon was initially limited to a one day commercial opening. Fortuitously, this information was augmented by catch and tag recovery information from an Aboriginal fisher who continually fished in the Dawson City area from September 5-30.

The initial post-season border escapement estimate is 51,791 with a 95% confidence interval of 44,404 to 60,386. This estimate has been expanded to 59,598 based on fish wheel timing information. Based on available catch information the escapement is estimated to be 55,803. A number of post-season reworking has to be done before a final escapement estimate is calculated.

The rebuilding goal for 2000 of > 80,000 chum salmon will not be achieved. The preliminary escapement estimate is 70.6% of the rebuilding goal and 72.3% of the 10 year average of 78,178.

[1] A range is used because different estimates were developed based on various run timing scenarios and the estimates calculated in-season did not involve a 10% reduction in the number of tags applied which is done to account for tag loss.

Comparative border and spawning escapement estimates from the tagging program for 1982 through Y2000 are presented in Attachment 12.

6.2.2 Harvest Sampling

The Canadian chinook test fishery and the 1-day commercial chum fishery were sampled in 2000 for age, length, sex, coded-wire tag (CWT) data, and spaghetti tag loss data.

An unweighted chinook salmon sample had a sex composition that was 39.8% female. This sample was collected over a five week period; 239 of the 761 test fish caught were sampled. Chinook salmon harvested in the test fishery were also examined for spaghetti tag loss. No tag loss was detected in this sample; i.e. no fish lacking tags exhibited tagging needle marks. One adipose-clipped fish were observed in the commercial fishery sample. Sixty chinook salmon harvested in the test fishery were also sampled for *Ichthyophonus hoferi*. The positive visual detection of 2 male and 2 female chinook salmon was confirmed in the lab and an additional 9 positive samples (3 males and 6 females) were detected when the cultures were examined in the laboratory.

A total of 200 fall chum salmon harvested in the commercial fishery were sampled. The sex composition of this sample was 28% female.

6.2.3 Whitehorse Rapids Fishway Chinook Enumeration

A total of 677 chinook salmon ascended the Whitehorse Rapids Fishway between July 25 and September 6, 2000. This was 46% of the 1990-1999 average count of 1,472 fish. The percentage of females was 56% (379 fish), which was above the recent 10-year average (34%).

There were no mortalities reported within the fishway in 2000. Record mortalities were recorded in the 1997 to 1999 period including 114 (5.4%) in 1997, 150 (19.3%) in 1998 and 113 (10.1%) in 1999. The impact of these mortalities is very significant when the number of females lost is considered. The number and percent of female mortalities for the 1997 to 1999 period was 103 (9.7%), 38 (23.6%) and 37 (19.8%), respectively. The reason for the high mortality rates observed might have been related to the water flow through the upper end of the fishway. Prior to the salmon run this year, an extra baffle was inserted which reduced the head and velocity of the water at the upper end of the fishway. The entrance of the fishway now has two baffles each involving a 0.305-meter vertical drop rather than a single baffle with a 0.61-meter vertical drop.[2] This appears to have resolved the problem.

Adipose-clipped fish accounted for 69% of the count and numbered 172 males and 294 females. The run mid-point and the peak daily count of 82 fish were both observed on of August 16.

[2] Increased storage of water in Schwatka Lake above the dam in recent years may have caused a hydraulic regime, which delayed salmon, migration within the ladder thus contributing to the moralities.

In 2000, no fish were specifically removed from the fishway for coded-wire tag sampling, however a number of samples were obtained from the broodstock. There were no weirs (i.e. Wolf or Michie creeks) in the upper drainage above the fishway this year.

Creative Salmon, a private aquaculture firm, collected milt from 40 males from the Whitehorse Rapids Fishway for cryo-preservation (gene banking).

6.2.4 Whitehorse Hatchery Operations

All the 162,829 chinook reared at the Whitehorse Rapids Fish Hatchery that were released in June were marked with adipose fin clips and coded wire tags. All the above mentioned were released into the Yukon River system upstream or the Whitehorse hydro dam. The fry releases into the Yukon River are as follows:

Wolf Creek: 50,590
Michie Creek: 61,675
McClintock River (above the confluence of Michie Creek): 50,564

All fry were released between June 4-10, 2000.

The total number of adult salmon, which were enumerated at the Whitehorse Rapids Fishway was 677. The first of which arrived on July 26, 2000. The run was comprised of 126 wild males, 172 hatchery males, 294 hatchery females and 85 wild females.

In August 2000, brood stock collection began after 32 adults had migrated through the Whitehorse Rapids Fishway. All attempts were made to collect two males for every female during brood stock collection to allow for matrix spawning in order to increase the potential genetic diversity of the offspring. Unfortunately, this was difficult to perform because of the low numbers of males returning. In order to allow for healthy escapement to the spawning grounds a total of 72 males were retained for the brood stock-spawning program. Of these males, 40 were adipose clipped and 32 were wild. In total, 24.2% of the male population was retained for the brood stock program. In addition to these males, milt samples were taken from seven males, which were released, back into the ladder to continue their migration to the spawning grounds. The number of females taken from the run was 62 fish comprising 16.4% of the female population. Of the females retained for brood stock, 43 were adipose clipped and 18 were wild. All females were successfully spawned with the exception of two fish; one, which proved to be green when it was spawned, and another that was released because it was not maturing during holding.

Egg takes began on August 17 and were completed on August 30, 2000. In total, 318,041 green eggs were collected from 60 females. Average fecundity was 5,301 eggs per female. The fertilization rate for the egg take was estimated to be 99%. Shocking and second inventory of these eggs began on October 8 and was completed on October 19. As of October 19 there are an

estimated 291,609 eyed eggs incubating in the hatchery. Survival from the green egg to the eyed stages was 92%.

6.2.5 Fishing Branch River Chum Salmon Weir

A weir established to enumerate chum salmon escapement to the Fishing Branch River has operated annually since 1985, except for 1990. Prior to 1985, a weir was operated during period between 1972-1975. Since 1991, the weir program has been conducted cooperatively by the Vuntut Gwitchin First Nation (VGFN)), of Old Crow, and Department of Fisheries and Oceans Canada. Escapement estimates for the Fishing Branch River, including aerial count expansions, have ranged from approximately 16,000 chum salmon in 1973 to 353,000 chum salmon in 1975 (Attachment Table 12).

In 2000, the weir was operational from August 27 to October 13. The weir was operative throughout this period with the exception of 7-day period, September 24-30, when there was a flood. Water was flowing over the weir for most of this period and repair work to the weir took 2 days after the water dropped. A total of 5,053 fall chum salmon were counted. The peak count (494 chum salmon) occurred on 16 September and the run mid-point was observed on September 15. The 2000 count was 13.6% of the recent 10-year average of 37,107 and only 10% of the lower end of the interim escapement goal range of 50,000 - 120,000 chum salmon. There were 77,278 chum salmon counted in 1996, the dominant cycle year. The 2000 count is the lowest recorded. The 1998 and 1999 counts were 13,564 and 12,094, respectively.

Generally, coho salmon are observed at the weir each year. However, the weir is not in place late enough to obtain quantitative information on the escapement.

DNA samples were collected from 200 juvenile coho salmon captured near the weir site. The samples will be forwarded to the USFWS laboratory in Anchorage for processing. The data collection will contribute to a drainage-wide stock identification study on coho salmon.

6.2.6 The Importance of Small Streams as Salmon Habitat in the Upper Yukon River Basin.

[M.J. Bradford and J.A. Grout (Fisheries and Oceans Canada, Resource and Environmental Mgmt., Simon Fraser University, Burnaby, BC, Canada, V5A 1S6; mbradfor@sfu.ca)]

Juvenile chinook salmon have long been observed to make use of very small streams as summer rearing habitat, however, the significance of these habitats is not clear. We selected a suite of small non-spawning streams that are tributary to the Yukon River near Whitehorse, Minto and Dawson City to contrast patterns of utilization in different parts of the Yukon River basin.

Young salmon emerge from spawning areas in May and distribute themselves downstream in the Yukon River in late May and June. In the Dawson City area, juveniles make extensive use of the mixing zone at the mouths of small, clear, creeks, probably because of the high sediment loads in

the Yukon River mainstem below the glacial White River. They begin to enter small non-natal streams in late June and early July

Once in the creeks, fish reach high densities and grew rapidly through the summer. Growth ceased in the September when water temperatures fell. Young salmon preferred small pools that were formed by scouring or fallen trees, and reached densities of up to 10 fish per square meter in these areas.

In the Whitehorse area fish were observed to stay in these streams in the winter, although their distribution and survival was affected by aufeis deposits, and the location of groundwater sources in the creek. Those that survived the winter grew rapidly in the spring months once the ice melted and water temperatures began to rise. Most fish left the creek in late June, presumably to migrate seaward as yearling smolts.

In the Dawson area fish were observed in the creeks in fall, but none were found in the spring months. Extensive ice deposits, and a lack of suitable groundwater flow meant that small streams in this area were not used as over-wintering habitat. We presume that most fish moved from the tributary creeks to the Yukon mainstem at the onset of winter.

Our results suggest there is a north-south cline in the use of these streams as habitat for juvenile chinook salmon. In the southern Yukon, the milder climate, less extensive permafrost, and glacio-lacustrine deposits underlying the area result in more extensive groundwater flows, which allows over-wintering. In the Dawson area, the high turbidity of the Yukon River makes these small streams essential habitat for these fish in the summer, but the lack of suitable flow prevents their use over-winter.

We conclude that small, clear streams that are tributary to large rivers in the Yukon basin are an important component of the production base for chinook salmon, and that they should be protected from land-use impacts associated with human activities.

6.2.7 Restoration and Enhancement Fund Projects

6.2.7.1 Restoration & Enhancement Projects - 2000

As footnoted, several project budgets have been adjusted in consideration of financial need, economies enabled, and in consideration of the total R&E funds available for the current year. The Canadian Co-Chair made these "fine tuning" decisions in consultation with the Panel's Executive Secretary and DFO staff (all figures in $Cdn).

Project #	Title	Contractor	Amount	TC[3]
RE-01-00	Croucher Creek Juvenile Salmon Migration Study, Phase II	Yukon Conservation Society/ Kwanlin Dun First Nation	$23,800	LM
RE-02-00	Traditional knowledge - Upper Pelly River System	Ross River Dene Council	10,000	LM
RE-03-00	Beaver Dam/Salmon Management – Carmacks Area	Little Salmon/Carmacks F	18,000	LM
RE-04-00	Tatchun Creek Spawner Enumeration Weir	Quixote Consulting (D. Otto)	32,700[4]	PM
RE-05-00	Salmon Restoration, Development and Implementation Plan – Upper Nord-enskiold River	Champagne-Aishihik First Nation	10,000	LM
RE-06-00	McQuesten River Stock Rebuilding – Habitat Alteration	Nacho Nyak Dun First Nation	20,000	LM
RE-07-00	Yukon River Salmon Tag Recovery	YRCF Assoc./THFN[5]	16,000	LM/PM
RE-08-00	Pond Incubation & Rearing Invest-	YRCF Assoc./THFN	12,000	LM
RE-09-00	Klondike Region Community Capacity Training	YRCF Assoc./THFN	5,000[6]	LM
RE-10-00	Contingency Chinook Test Fishery	YRCF Assoc./THFN	22,700[7]	PM
RE-11-00	Chinook Salmon Enumeration – Tincup Cr., Kluane R., White R.	Kluane First Nation	14,000	PM
RE-12-00	Whitehorse Hatchery CWT & Recovery	Dept. of Fisheries & Oceans	50,000[8]	PM
RE-13-00	Yukon Fisheries Information System	Dept. of Fisheries & Oceans	55,000[9]	LM
TOTAL			$289,200[10]	

[3] Technical Contact (DFO) for the contractor - LM/Lana Miller & PM/Pat Milligan of DFO.

[4] This project was terminated early due to high water conditions affecting the operation of the weir and the condition of the run. Although alternate related work was being considered within the budget this is now unlikely to occur with the result of a limited net reduction to the overall cost of this project.

[5] Yukon River Commercial Fishers' Association and the Tr'ondek Hwech'in First Nation.

[6] Subsequently approved an increase for this project to a total of $11,600.

[7] This test fishery was extended for a week at the request of DFO to ensure collection of an adequate data based on in-season tracking of the "run". The increased costs include costs incurred in extending the test fishery and associated reasonable costs of those operating the test fishery with the result of a total project cost of $27,100.

[8] This figure will be adjusted to accommodate the increased project costs for RE-09&10-00 and in consideration of cost savings to be accrued from RE-04-00 and the residual R&E projects balance at year end, with any shortfall to be absorbed by DFO.

[9] Originally determined to be $45,000 but adjusted to a maximum of $55,000 based on need and the free balance available. The actual expenditure will be based on documented actual costs incurred within this total.

6.2.7.2 Status Of 2000 Restoration & Enhancement Projects

Fisheries and Oceans Canada and Canadian members of the Yukon River Panel approved 13 R&E projects in 2000 for an expenditure of $196,000US/$289,200Cdn[11] of the $215,000US granted for R&E projects in Yukon during the year 2000/2001. All projects were activated and are either underway or completed. Following is brief description and the status of each project (with all figures in $Cdn).

RE-01-00 Yukon Conservation Society & Kwanlin Dun First Nation $23,800
"Croucher Creek Juvenile Salmon Migration Study – Phase II"

The purpose of this project is to document the timing and characteristics of out-migrating 1+ and in-migrating 0+ juvenile Chinook salmon in a non-natal stream in Croucher Creek, a tributary of the Yukon River basin in the Whitehorse area. The information gathered will be used to assess timing of windows for in-stream restoration or other associated work in the non-natal Yukon streams or for information to increase the success of stock restoration. A broader related purpose is to develop the related technical skills in the Yukon Conservation Society and the Kwanlin Dun First Nation to act as stewards for this drainage to ensure the future development activities do not negatively affect the system in relation to the production of salmon.

The objectives of this project are to:

1. Determine the timing, magnitude and characteristics of the out-migration of 1+ juvenile chinook salmon (smolts), which may have over-wintered 2 years in the non-natal stream Croucher Creek using minnow trapping.
2. Determine the timing, magnitude and characteristics of the in-migration of 0+ juvenile chinook salmon and their upstream migration patterns using minnow trapping.
3. Delineate habitat range and behavioral characteristics of slimy sculpins in Croucher Creek to determine if they could effectively used as indicator species to monitor and protect the health of habitats used by chinook salmon in the Yukon.
4. Develop an information base of species presence and behavior, as well as technical resources for KDFN and the YCS, which can be used by current and future stewards of this creek, watershed and other similar streams used by salmon to ensure habitat and watershed health protection.

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[10] The total funding available is $215,000US minus an administrative charge for the transfer of the funds of $17.02US, with conversion to Canadian funds provided a 2000 R&E Fund of $294,923.12. The US administration contribution of $15,000US/$22,039.48Cdn has been transferred to the Administration account. A separate financial summary provides a statement of the R&E accounts for the three years 1997/98 – 1999/2000 inclusive, and 2000/01 of remaining commitments and free balances.

[11] Several project budgets have been adjusted in consideration of financial need, economies enabled, and in consideration of the total R&E funds available for the current year. The Canadian Co-Chair made these "fine tuning" decisions in consultation with the Panel's Executive Secretary and DFO staff. The details are identified in the Note projects RF-09,10&12-00.

The data collected thus far indicates there was no evidence found to support the hypothesis that juvenile Chinook salmon over-wintered two seasons in Croucher Creek. Rainfall during the 2000 field season was higher than normal. A preliminary view of the Croucher Creek data indicates a smaller percentage of re-capture of juvenile Chinook salmon and sculpins. Those that were re-captured often were originally tagged in a different area than where they were caught a second time. This differs from previous field seasons on Croucher Creek where the juvenile chinook salmon tended to be found in the same region of the Creek for a period of time. These results may show that sculpins have a larger habitat range than is currently thought, or it could be an anomaly due to the high water flows this year.

This project is proceeding on schedule with a further written progress report due shortly, and the final report due December 15, 2000.

RE-02-00 Ross River Dene Council $10,000
"Traditional Knowledge Study – Upper Pelly River System"

The purpose of this project is to collect the traditional and local knowledge pertaining to salmon in the Upper Pelly River System. This is the first step toward development of a management plan to restore and enhance depleted stocks of this system; and ultimately to more effectively involve the Ross River Dene Council in the management of salmon stocks in their traditional territory. The objectives of this project are to:

1. collect, code, catalogue, and map traditional knowledge as it applies to salmon resources in the study area, using a video camera as the medium; and,
2. prepare a quality VHS film of salmon (ecology and management) and its cultural importance to the Kaska Dene.

This is a shared cost project with the Panel paying for the interviews and compilation of the data called for in the first objective. The Ross River Dene Council are providing the hardware and related support system to achieve the second objective, which contributes as well to a broader project of this First Nation that relates to the documentation of their traditional knowledge in their traditional territory.

This project is progressing on schedule, with the final report to be submitted on November 12, 2000.

RE-03-00 Little Salmon/Carmacks First Nation $18,000
"Beaver Dam/Salmon Management – Lower Nordenskiold River & Klusha Creek"

The purpose of this project is to follow up on previous studies that assessed the habitat of this system, and to proceed to remove and/or alter some of the beaver dams and other obstructions that are thought to obstruct salmon movement in this system. The funds provided are largely for wages for the physical work on the Creek with the First Nation providing equipment and also complimentary wages to the extent available.

This project is closely coordinated with RE-05-00, which involves the upper reaches of the Nordenskiold River, and the Habitat Restoration Salmon Enhancement Program (HRSEP) involving an inventory of potential Chinook salmon habitat from Little Braeburn Lake to Airport Lake on Klusha Creek.

The objective of the project is to alter beaver dams and other obstructions to salmon passage on the lower Nordenskiold River from the confluence with the Yukon River to the confluence with the Kirkland Creek; and, continue the same activity on Klusha Creek between Airport and Twin Lakes, and upstream of Twin Lakes if funds permit.

The project was successfully completed – with 25 beaver dams and other obstructions removed in the lower reaches of the Klusha and Nordenskiold rivers, with free passage being provided to salmon in August. The final report is presently being drafted, and is expected on schedule, on November 15, 2000.

RE-04-00 **Quixote Consulting (Darrell Otto)** **$32,700**
"Tatchun Creek Spawner Enumeration"

The purpose of this ongoing project is to provide information regarding recruitment rates and sex ratio of chinook salmon spawners ascending Tatchun Creek at a weir at the mouth of the Creek, as well as the proportion of fish from this stream affected by the local sport fishery.

The objectives are to:

1. determine the spawning recruitment (including sex ratios, numbers of tagged spawners, and fork length measurements) of chinook salmon returning to Tatchun Creek;
2. collect tissue samples for DNA analysis and scale samples for assessing age structure of the returning salmon; and,
3. train Little Salmon/Carmacks First Nation crew in Gee minnow trapping on the creek.

The project weir was implemented, but the enumeration was terminated early (began on August 2 and terminated on August 23 when the weir was washed out) due to very high water levels, which removed the weir from service. The monitoring of the sport fishery did not occur as the sport fishery was closed due to the very low run this year.

The enumeration and other data collected while the weir was in operation were provided to DFO, and the Gee minnow traps were set and retrieved on September 6 & 7.

The final report, along with the final financial settlement for this terminated project, is due October 31, 2000.

RE-05-00 **Champagne & Aishihik First Nations** **$10,000**
"Salmon Restoration – Upper Nordenskiold River"

The purpose of this project is to build on earlier related projects on the Nordenskiold to develop a management plan and to implement the plan to restore chinook salmon stocks to this drainage by removing obstructions for spawning salmon. This is directly complimentary to project RE-03-00.

The specific objective of the project was to remove/alter beaver dams and other obstructions to the upstream movement of spawning chinook salmon to the upper reaches of the Nordenskiold River. This field aspect of the project was successfully completed in close coordination the Little Salmon/Carmacks First Nation that was working on the lower reaches of this system. Twelve dams were breached and water quality and quantity assessments were conducted in July. The Champagne & Aishihik First Nation provided complimentary infrastructure and support.

The final report is being drafted and is due on November 15, 2000.

RE-06-00 **Nacho Nyak Dun First Nation** **$20,000**
"McQuesten River Stock Rebuilding and Habitat Restoration Project
Part 1 – Salmon Incubation $7,300
Part 2 – Logjam Diversion $12,700"

The purpose of this project is to build on earlier management planning and field operations on the McQuesten system, to involve: a trial incubation project on the McQuesten River; and to hand-excavate a partial diversion of the McQuesten River to provide access for upstream migrating chinook salmon.

The specific project objectives are to:

1. To conduct a trial incubation of the McQuesten system by:
    a. conduct a trial egg take in the McQuesten River to provide eggs for trial incubation - this objective was altered in light of the poor run, rather than sacrifice any spawning fish in this system, and the modified brood stock protocol, with eggs to be provided by the McIntyre Creek facility if a minimum of 10 females and 20 males are documented in this reach of the McQuesten;
    b. test 3 groundwater sites with McQuesten River eggs to determine which site would be most suitable for a future larger scale incubation project;
    c. monitor temperatures at the groundwater sites and at the egg take site to determine emergence timing, and to conduct preliminary fry trapping at the egg take/release site to assist in the development of release strategy; and,
    d. mark local eyed eggs available to the HV Clark School in Mayo for the purposes of classroom incubation, to promote stewardship of the local salmon resource.
2. To create a partial diversion of the McQuesten River that will isolate a logjam and facilitate access for upstream migrating chinook salmon by:
    a. hand-excavating a partial diversion of the McQuesten River which will isolate a logjam and provide access for upstream migrating chinook salmon including removal of barrels from the logjam; and,

b. through the employment of local First Nation citizens in the project, develop greater understanding of the techniques involved in salmon stock and habitat restoration.

Both parts of this project have been launched. Detailed progress reports are not available at this time. The final report for Part 1 is due on March 15, 2001, and Part 2 is due on November 30, 2000.

RE-07-00 **Yukon River Commercial Fishers' Association & Tr'ondek Hwech'in First Nation "Klondike River Sampling & Redd Mapping"** **$16,000**

The purpose of this project is to continue with earlier projects directed to the restoration of salmon stocks in the Klondike system and other selected water courses in the Dawson area. Salmon redds will also be documented by GIS which in combination with data collected earlier will be used to better protect salmon stocks.

The specific objectives are:

1. sample adult chinook for adipose clips to determine the marked/un-marked ratios of adult chinook salmon returning to the Klondike, and analyze fry-adult survival rates from the release of fry from previous projects thereby providing an estimate of fry-to-adult survival for returning North Klondike incubation box fry releases;
2. map chinook salmon redds and sample juvenile chinook fry on the Klondike River while in the area and provide salmon eggs to a pilot incubation project;
3. use collected information to gain knowledge of the watershed, contribute to watershed planning, provide regulators with information so they can make informed decisions on stock conservation, and to assist in public awareness; and develop a rationale to further protect salmon stocks on the Klondike River (i.e. fishing regulations/closures); and,
4. involve fishers and First Nations People in this project to develop further public awareness regarding local salmon stocks and foster a stewardship ethic in the community.

This project is proceeding well, including:

- Juvenile sampling commenced June 2nd on the Klondike River and continued weekly, with a few additional "exploratory" sample dates due to high water/poor juvenile availability. An increased number of fry traps have been used to maintain a higher sample size. Temperature data loggers have been employed in the Klondike and in a side-slough groundwater source. Maintenance has been performed on river and aircraft equipment used to survey adult chinook salmon and break-mesh nets have been tied. Personnel for sampling were hired and trained in a timely manner.
- Aerial and snorkel surveys were conducted but unsuccessful due to extreme high water and low numbers of salmon utilizing the survey area. Never-the-less, valuable data was collected and the project is fostering watershed stewardship and partnerships through the hiring of local fishers and First Nation citizens.
- GPS/GIS training was re-scheduled and completed and the necessary hardware and software was acquired cooperatively with other agencies and projects for reasons of economy.

The final report is due December 31, 2000.

RE-08-00 **Yukon River Commercial Fishers' Association & Tr'ondek Hwech'in First Nation** **$12,000**

"Pond Incubation & Rearing Investigations"

This is a continuation of earlier projects designed to restore salmon stocks in the selected watercourses in the Dawson area, focused on establishing the feasibility of developing an incubation/out-planting program in the Klondike region. This project is directed to gathering further data essential to determining an appropriate site.

The objectives are to:

1. gather essential water quality information from sites identified in previous studies;
2. determine the suitability of these sites for incubating and rearing salmon fry;
3. develop the means to incubate and rear salmon fry at the sites as part of an overall program to restore salmon stocks in the Klondike region; and,
4. involve fishers and First Nation's citizens in this project to get vital information and to foster a stewardship ethic in the community.

The project has progressed through the initial tasks of purchasing project equipment, water temperature dataloggers have been deployed, appropriate water quality parameters have been established, lab testing and freight logistics have been worked out, and personnel have been acquired to conduct the necessary research. (Rearing technologies remain a concern in the region.)

A further progress report is due on March 1, 2001 and the final report is due September 1, 2001.

RE-09-00 **Yukon River Commercial Fishers' Association & Tr'ondek Hwech'in First Nation** **$5,000**

"Klondike Community Capacity Building"

The purpose of this project is to provide computer literacy training necessary to involve local persons – fishers and First Nation citizens - to build community capacity to effectively become involved in salmon and habitat restoration activities.

The specific objectives focused on providing basic computer literacy and in particular MS Word and MS Excel, Internet applications and report writing skills. This project has been successfully completed, and for reasons of cost efficiency and effectiveness the number of students was increased. Complimentary financial and other support was provided by the Yukon River Commercial Fishing Association, Yukon Salmon Committee, DFO and Klondike InfoTech.

An increase to this project allotment (the total direct cost of $11,600, and increase of $6,600) was approved, with the increased funding to be made available from surpluses available from other 2000 projects (RE-04&12-00) and/or the existing free balance available in the R&E Fund.

The final report for this project is currently being written and is expected to be received on schedule October 31, 2000.

RE-10-00 **Yukon River Commercial Fishers' Association & Tr'ondek Hwech'in First Nation** **$22,700**

"Contingency Chinook Test Fishery"

The primary purpose of this project is to gather in-season mark re-capture data to assist DFO fisheries managers to estimate run-abundance and thereby manage the in-season fisheries in consideration of spawning escapement needs for related stock rebuilding targets

The specific objectives are to:

1. recover spaghetti tags applied by DFO at Sheep Rock and White Rock fishwheels;
2. determine the tagged/untagged ratios during the chinook season so that stock assessment can take place, with estimates of run abundance, spawning escapement, and rebuilding success;
3. provide some commercial fishers with alternate employment in the event of a commercial fishery closure; and,
4. involve fishers and First Nation's citizens in this project to provide vital information and to foster a stewardship ethic in the community.

The project was successfully completed during the 5-week period of July 12 to August 10, with the data being provided in a timely manner to DFO. The Tr'ondek First Nation authorized the test fisheries, and the fish taken were provided to First Nation's citizens.

Financial and other support was provided to this project by the Tr'ondek Hwech'in First Nation, the Yukon River Fishing Association and DFO. An increase to the R&E cost for this project of $4,400 in consideration of the test fishery being extended a week beyond the predicted requirement. This incremental cost will be dealt with either through surplus project funds available (RE-04&12-00) and/or the residual R&E balance from previous years.

The final report has been submitted for this project.

RE-11-00 **Kluane First Nation** **$14,000**

"Chinook Salmon Enumeration - Tincup Creek"

The purpose of this project is to compliment earlier R&E projects on this system to enumerate chinook salmon and to document and assess chinook salmon habitat on new reaches of the Tincup Creek system.

The objectives of this phase of this project are to:

1. enumerate chinook salmon and to asses the salmon habitat on the #2&3 upper reaches, and #11&12 lower reaches of Tincup Creek and Swanson Creek; and,
2. train and involve to crews of Kluane First Nation citizens in the related field techniques.

The project has been successfully completed and a draft report has been submitted. The reaches identified were assessed from a habitat management perspective – with a general description being

developed, chinook salmon observed from the shore were noted (18 spawners), and chinook fry were captured in all reaches.

RE-12-00 **Department of Fisheries and Oceans** **$50,000**
"Whitehorse Rapids Hatchery CWT and Recovery"

The purpose of this project was to ensure that all salmon released from the Whitehorse Hatchery in the spring of 2000 were tagged with coded wire tags and had their adipose fin clipped. The objectives of this project are as described above and will include data analysis of the historical CWT information up to date.

The primary portion of this project has been completed while the multi-year analysis is pending. The tagging and clipping were completed successfully and returns documented. A total of 161,198 coded wire tags were placed on chinook fry and 1,631 clipped and untagged chinook fry were released in three locations. The tag retention for the 2000 release group was estimated to be 99%. The total release of chinook salmon fry to the three release locations was: Wolf Creek – 50,590, Michie Creek – 61,675, and McClintock River (above falls) – 50,564. The average weight of the fry released in the various release groups ranged from 2.40 to 2.84 grams. The number of release locations was reduced in 2000 due to the lower number of fish available. Fry were not released into Byng Creek, Fox Creek or Judas Creek. The final report pending.

RE-13-00 **Department of Fisheries and Oceans** **$55,000**
"Yukon Fisheries Information System"

The Yukon Fisheries Information Summary System is a project to update the fisheries habitat data management system for the Yukon Territory. The FISS allows groups and individuals to access fisheries and habitat data via the Internet. The system will be used to map data points onto 1:50,000 maps, which will eventually, be included as spatial data on the Internet on a 1:250,000 scale).

DFO and the Fisheries Branch of the Yukon Government were partners in this project with considerable resources contributed directly by both agencies.

A system was set up, staff hired and trained, and data and reports available since 1995, including hundreds of Yukon based reports accumulated and entered into the system.

This project is complete, with the final report pending.

6.2.7.3 Proposed Interim Call Process For Canadian Yukon River Restoration & Enhancement Projects Yr. 2000/2001

Rationale:

- To implement an adjusted R&E call and review process, including schedule, for R&E projects for the operational year 2000/2001.

- The proposed adjustments to the former R&E call and review process of the Panel are relatively minor and intended to improve the effectiveness of the R&E program. The changes involve one earlier step – an initial call for conceptual project outlines, and a more supportive approach to project development and review.
    - An initial call for conceptual proposals - one page description of the proposed project.
    - This is intended to: start the process earlier in the year – while many of the contractors are still in the field; and, to enable the contractors to be advised at this early stage by the Canadian section of the Panel as to whether or not their conceptual proposal has merit sufficient to commit the time and effort to proceed to a detailed proposal.
    - This adjustment to the process potentially would enable the Panel to be more "directive" in encouraging projects, as requested by the Panel at its last R&E review meeting in Teslin. The objective is to achieve proposals that are most efficient and effective in achieving Panel goals while building more community based interest and capacity/involvement in salmon and habitat protection and restoration for the Yukon River system.
- These adjustments are primarily directed to the Panel's call in Yukon, Canada. This process would also enable experimentation with these proposed adjustments to the established R&E review process in Canada.
- This adjusted process is intended to achieve operational efficiencies during the present transitional year on an experimental basis primarily for the future Canadian based review of a portion of the future R&E budget as envisioned in the draft Agreement. The experience gained during this "transitional" year would enable the Panel to consider future "post agreement" R&E review processes.

Proposed Revised R&E Project Call and Review Process for 2000/2001 in Canada

Step 1 – September 30	Advertise a call for conceptual proposals[12]
Step 2 – October 30	Deadline to receive the conceptual proposals.
Step 3 – November 15	Correspondence in response to each conceptual proposal – either "not of interest/priority to the Panel" or "please proceed to develop a detailed proposal.
Step 4 – January 15	Deadline to receive detailed project proposals.
Step 5 – January 31	Project proposals forwarded to respective reviewers
Step 6 – February 20	Technical reviews collated and forwarded to Panel members
Step 7 – March 15	Panel review and decisions

[12] Noting that this call is in the event that a R&E funding is to be confirmed for 2000/2001.

6.2.8 Habitat Restoration And Salmon Enhancement Program (HRSEP) and Community Development and Education Program (CDEP)

Program Introduction

The Habitat Restoration and Salmon Enhancement Program (HRSEP) was established in January 1997 to complement the Pacific Salmon Revitalization Strategy. The main objective of the three year, $15 million program is: to increase the quality and quantity of salmon habitat in conjunction with conserving and rebuilding weak salmon stocks in British Columbia and the Yukon. Program objectives encompass three major categories in the on-going effort to ensure healthy salmon stocks - Resource and Watershed Stewardship, Habitat Restoration and Stock Rebuilding. Activities in each category are designed to encourage community-based stewardship, increase the quality or quantity of in-stream and riparian habitat and rebuild stocks through intensive assessment and enhancement techniques. In June of 1998, the Pacific Salmon Fisheries Restructuring Program was announced, extending the HRSEP for an additional $20 million over 3 years. The fiscal year 2001/02 is the final year of this program.

In 2000, HRSEP funded a number of CDEP projects in the Yukon. CDEP projects have developed over the years using funds from a variety of sources including the R&E Fund, economic development initiatives, community groups, etc.

Status of 2000 Habitat Restoration and Salmon Enhancement Program Projects

00-YT-RWS-014
Streamkeepers North Society

School Fry Release Field Trips

The primary objective of this project is to enable schools involved with the Salmon in the Classroom program to participate in fry release field trips. These schools monitor water temperatures, incubate chinook or chum salmon eggs and rear emergent fry in classroom aquariums. The field trips enable students, teachers and parents to learn more about salmon in their natural environments and often include various habitat studies such as invertebrate sampling and water quality testing.

School releases in the spring of 2000 were as follows:

- 4 classes released approximately 215 chinook fry into Tatchun Creek,
- 3 classes released 400 chinook fry into the Morley River,
- 1 class released 300 chum fry into Kluane River, and
- 13 classes released 615 fry into Flat Creek or into the McIntyre site for subsequent release into Flat Creek.

Partners: Streamkeepers North Society, various Yukon Territory schools, Whitehorse Correctional Centre, Department of Fisheries and Oceans Canada – Habitat and Enhancement Branch

00-YT-ST-012
Whitehorse Correctional Centre Inmates Society
McIntyre Creek Salmon Incubation Project

The primary objective of this project is to develop, monitor and evaluate low-technology ground water fed incubation facilities and techniques under northern interior climatic conditions. The project was initiated in 1989. The Whitehorse Correctional Centre has operated this project since 1996, and continues to do so.

In 1999-2000, approximately 52,000 Takhini River fry were tagged and released into Flat Creek. Twenty-four thousand were released on June 23, and 28,000 were released on June 24th at a public event with DFO. Survival of Takhini eggs was approximately 90%. Approximately 14,000 Tatchun fry were released into Tatchun Creek on June 19, 2000. Tatchun eggs suffered heavy fungus during incubation, and many newly emergent fry were lost due to a flow diversion accident when fry were being transferred to rearing ponds. Survival from green egg to fry release was 30%.

A new heath stack system was tested at McIntyre with a couple of hundred Tatchun eggs between the eyed and emergent stages. There were no ice problems and survival was excellent. This small tray system may alleviate the problem with fungus spreading in the future.

In August 2000, approximately 28,000 chinook eggs were taken at the Takhini River. An additional 5,000 eggs were taken from a fresh tagged carcass at the mouth of the Ibex River, but the viability of these eggs is uncertain. Approximately 28,000 chinook eggs were taken at Tatchun Creek from six females. Five thousand of the Tatchun eggs are being incubated in the new heath stack. The Whitehorse Correctional Centre is monitoring and maintaining the site.

Partners: Whitehorse Correctional Centre, Streamkeepers North Society, Fisheries and Oceans Canada – Habitat and Enhancement Branch and Stock Assessment Division, Wood Street School.

00–YT–ST-002
Yukon River Commercial Fishing Association/Tr'ondek Hwech'in First Nation
Chandindu River Salmon Enumeration Weir

This project is part of a larger program designed to restore salmon stocks in selected watercourses in the Dawson area. The purpose of this project was to enumerate chinook salmon (and early chum salmon) on the Chandindu River, a tributary of the Yukon River in the Dawson Area. This enumeration, over a period of several years, provides the means to determine the availability and characteristics of potential chinook broodstock and to collect vital mark-recapture data for stock management purposes. Juvenile sampling was also conducted at the weir site to determine natural fry sizes. This information will be used in the future to help determine optimal sizes for out-planted fry in this system.

The weir was operated from August 16 to Sept 15, 2000. Extreme high water delayed the start date of the project and presented many challenges to the project's crew and equipment. Unfortunately, the difficult environmental conditions resulted in very low numbers of chinook salmon being enumerated and an estimate of broodstock availability for the 2000 season is not available. The project was able to extend its original operation dates to September 15 in an effort to enumerate fall chum salmon returning to the area, conduct preliminary R&E work on the Fifteenmile River system and salvage and maintain project equipment.

This project fostered watershed stewardship and partnership building through the employment and training of local Fishers and First Nations.

Partners:
Yukon River Commercial Fishing Association/Tr'ondek Hwech'in First Nation, Fisheries and Oceans Canada – Habitat and Enhancement Branch and Stock Assessment Division

00-YT-HR-010
Champagne and Aishihik First Nation
Upper Nordenskiold River Obstruction Removal

This project is part of a larger program designed to restore chinook salmon stocks to the Nordenskiold River sub-basin in Carmacks, YT. Throughout the last 30 years, the construction of beaver dams in this system has prevented chinook salmon access to historical spawning areas. For the second consecutive summer, unobstructed access to the Upper Nordenskiold River was created for spawning salmon. Twelve beaver dams were breached and water quality and quantity assessments were conducted in July of 2000. Efforts to monitor the numbers and distribution of adult chinook were hindered by unusually high and turbid water. Champagne and Aishihik First Nation are working in partnership with the Little Salmon Carmacks First Nation to restore salmon stocks in the Nordenskiold River system.

Partners:
Champagne and Aishihik First Nation, Little Salmon/Carmacks First Nation, Fisheries and Oceans Canada – Habitat and Enhancement Branch

00-YT-RWS-006
Yukon Conservation Society and Little Salmon/Carmacks First Nation (LSCFN)

Assessment of the Quantity and Quality of Potential Chinook Spawning Habitat in Klusha Creek, a Tributary to Nordenskiold River. This project is part of a larger program designed to restore chinook salmon stocks to the Nordenskiold River sub-basin in Carmacks, YT. This was the second year of inventory on Klusha Creek and it involved the continuation of mapping habitat features, collecting flow measurements, deploying temperature data loggers and minnow trapping. This inventory will provide part of the background necessary to develop a restoration plan for this depleted stock of chinook salmon. This project also fostered watershed stewardship and partnership building through the employment and training of local First Nation youth.

Partners:
Yukon Conservation Society, Little Salmon/Carmacks First Nation, Fisheries and Oceans Canada – Habitat and Enhancement Branch

00-YT-HR-001
Selkirk First Nation
Salmonid Habitat Restoration and Monitoring – Pelly River

This project is part of a larger program designed to restore chinook salmon stocks in three tributaries to the lower Pelly River. For many years, the construction of beaver dams in Mica, Willow and Needlerock Creeks prevented access to historical spawning areas for chinook salmon and other freshwater fish species. For the third consecutive summer, unobstructed access to the upper reaches of these three creeks was created for spawning salmon and other freshwater fish. Assessments of physical habitat characteristics and fish utilization were conducted in the summer of 1998 and repeated in the summer of 2000 to contribute to the evaluation of this program. Preliminary results indicate that in Mica Creek, spawning chinook salmon were observed considerable distances further upstream in 2000 than in similar studies conducted in 1998. Juvenile chinook salmon were utilizing more habitat in Willow Creek in 2000 compared to results from similar studies conducted in 1998. No significant change in the distribution of juvenile or adult chinook salmon in Needlerock Creek was observed from 1998 to 2000.
Partners:
Selkirk First Nation, Yukon Territorial Government – Renewable Resources, Fisheries and Oceans Canada – Habitat and Enhancement Branch

00-YT-HR-008
Kwanlin Dun First Nation
Michie Creek Beaver Management

The McClintock River and tributaries Michie Creek and Byng Creek, are important chinook spawning habitat in the Upper Lakes/South Mainstem sub-basin of the Yukon River. This system is also one of several creeks that is enhanced by annual fry releases from the Whitehorse Rapids Fish Hatchery. For many years, the construction of beaver dams in Michie and Byng Creeks has prevented access to historical spawning areas for chinook salmon. For the third consecutive summer, access to these spawning areas was restored. This project involved breaching several beaver dams on both creeks, and harvesting one beaver in early August. In mid-August, more than 20 adult chinook were observed above the location of the most upstream dam that was breached. Efforts to monitor the numbers and distribution of adult chinook in late August were hindered by unusually high and turbid water. No adult salmon were observed in Byng Creek.

00-YT-HR-003
Klondike Snowmobile Association, Trans-Canada Trailway
Wolf Creek Snowmobile Trail Relocation Bank Restoration

Wolf Creek is an important chinook spawning tributary to the Upper Lakes/South Mainstem sub-basin of the Yukon River. It is also one of several creeks that is enhanced by annual fry releases

from the Whitehorse Rapids Fish Hatchery. Because of the creek's proximity to the City of Whitehorse, it is flanked by housing development, roads and a large network of trails. The Trans-Canada Trail crossing of Wolf Creek is located close to an existing snowmobile and ATV trail that runs through the creek in several places. This repetitive instream activity likely disturbs instream habitat such as substrate, algae and invertebrate populations. Impacts to riparian vegetation and bank stability are also visible. In the fall of 2000, an approach for the new crossing was created, numerous trees were planted and the site was seeded with grass. In the summer of 2001, the bridge will be installed, the old trail that runs through the creek will be deactivated and rehabilitation of those areas will begin. Signage will be erected to promote public awareness of fish habitat.
Partners:
Klondike Snowmobile Association, Yukon Fish and Game Association, Fisheries and Oceans Canada – Habitat and Enhancement Branch

00-YT-ST-017
Wolf Creek Monitoring Project
Yukon Fish and Game Association

Wolf Creek is an important chinook spawning tributary to the Upper Lakes/South Mainstem sub-basin of the Yukon River. It is also one of several creeks that is enhanced by annual fry releases from the Whitehorse Rapids Fish Hatchery. This project involved weekly stream surveys immediately prior to and during peak spawning season. The crews identified and mapped obstructions to migration that were subsequently removed by Yukon Youth Conservation Crews. Survey crews also enumerated several adult chinook.

This project fostered watershed stewardship through the employment and training of local youth.

Partners:
Yukon Fish and Game Association, Whitehorse Rapids Fish Hatchery, Fisheries and Oceans Canada – Habitat and Enhancement Branch

Habitat Conservation and Stewardship Program (HCSP)

The Habitat Conservation and Stewardship Program (HCSP) is part of DFO Pacific Region's Resource Rebuilding Program. The HCSP is a "B-based" program: that is, the program was designed to, and is required to, meet specific objectives. The HCSP objectives are to:

- nurture the adoption of a stewardship "land ethic" by government and non-government stakeholders;
- incorporate fish habitat protection requirements into all levels of land and water use planning;
- increase public and stakeholder awareness of fish habitat requirements;
- improve habitat mapping, inventory data, etc. to improve decision-making with respect to land management and resource planning;
- increase local stream surveillance and monitoring;

- improve compliance monitoring of development projects;
- provide technical information, advice, and support to partners and communities;
- increase community participation in existing land and water use planning and/or the development of watershed management plans;
- ensure the enhancement and restoration of habitats is completed in the context of an overall watershed strategy or management plan(s); and
- increase community responsibility for watershed management and protection.

The HCSP is based primarily on forming partnerships with organizations, governments and entities outside of DFO to fund positions for Stewards. These organizations are termed "Community Partners". There are also a limited number of positions within DFO.

In the Yukon the Yukon Salmon Committee is the main Community Partner. The YSC has six Habitat Stewards located in Yukon Communities. Names, addresses and geographical areas of responsibility follow:

Stephanie Muckenhiem – Alaska Highway North - White River sub-basin
Phone: 867-634-3843
Fax: 867-634-3842
yscstephanie@yukon.net
Box 2118, Haines Junction, YT, YOB 1L0

George Sidney – Teslin – Teslin River sub-basin
Phone: 1-800-638-9288 Extension 433
Fax: 867-390-2116
georgesidney@hotmail.com

Jake Duncan - Dawson – Yukon River North Mainstem sub-basin
Phone: 867 - 993 – 6210
Fax: 867 - 993 - 6093
jduncan@yknet.yk.ca
Box 844, Dawson City, Y0B 1G0

Beverley Brown – Carmacks – Yukon River Mid-Mainstem sub-basin
Phone: 867 – 863 - 5520
Bevysc@yknet.yk.ca

Isaac Anderton – Old Crow – Porcupine River sub-basin
Phone: 867 – 966 – 3034
Fax: 867 – 966 – 3620
Vgrrc@yknet.yk.ca
Box 80, Old Crow YT, Y0B 1N0

Wolf Creek is an important chinook spawning tributary to the Upper Lakes/South Mainstem sub-basin of the Yukon River. It is also one of several creeks that is enhanced by annual fry releases from the Whitehorse Rapids Fish Hatchery. Because of the creek's proximity to the City of Whitehorse, it is flanked by housing development, roads and a large network of trails. The Trans-Canada Trail crossing of Wolf Creek is located close to an existing snowmobile and ATV trail that runs through the creek in several places. This repetitive instream activity likely disturbs instream habitat such as substrate, algae and invertebrate populations. Impacts to riparian vegetation and bank stability are also visible. In the fall of 2000, an approach for the new crossing was created, numerous trees were planted and the site was seeded with grass. In the summer of 2001, the bridge will be installed, the old trail that runs through the creek will be deactivated and rehabilitation of those areas will begin. Signage will be erected to promote public awareness of fish habitat.
Partners:
Klondike Snowmobile Association, Yukon Fish and Game Association, Fisheries and Oceans Canada – Habitat and Enhancement Branch

00-YT-ST-017
Wolf Creek Monitoring Project
Yukon Fish and Game Association

Wolf Creek is an important chinook spawning tributary to the Upper Lakes/South Mainstem sub-basin of the Yukon River. It is also one of several creeks that is enhanced by annual fry releases from the Whitehorse Rapids Fish Hatchery. This project involved weekly stream surveys immediately prior to and during peak spawning season. The crews identified and mapped obstructions to migration that were subsequently removed by Yukon Youth Conservation Crews. Survey crews also enumerated several adult chinook.

This project fostered watershed stewardship through the employment and training of local youth.

Partners:
Yukon Fish and Game Association, Whitehorse Rapids Fish Hatchery, Fisheries and Oceans Canada – Habitat and Enhancement Branch

Habitat Conservation and Stewardship Program (HCSP)

The Habitat Conservation and Stewardship Program (HCSP) is part of DFO Pacific Region's Resource Rebuilding Program. The HCSP is a "B-based" program: that is, the program was designed to, and is required to, meet specific objectives. The HCSP objectives are to:

- nurture the adoption of a stewardship "land ethic" by government and non-government stakeholders;
- incorporate fish habitat protection requirements into all levels of land and water use planning;
- increase public and stakeholder awareness of fish habitat requirements;

- improve habitat mapping, inventory data, etc. to improve decision-making with respect to land management and resource planning;
- increase local stream surveillance and monitoring;
- improve compliance monitoring of development projects;
- provide technical information, advice, and support to partners and communities;
- increase community participation in existing land and water use planning and/or the development of watershed management plans;
- ensure the enhancement and restoration of habitats is completed in the context of an overall watershed strategy or management plan(s); and
- increase community responsibility for watershed management and protection.

The HCSP is based primarily on forming partnerships with organizations, governments and entities outside of DFO to fund positions for Stewards. These organizations are termed "Community Partners". There are also a limited number of positions within DFO.

In the Yukon the Yukon Salmon Committee is the main Community Partner. The YSC has six Habitat Stewards located in Yukon Communities. Names, addresses and geographical areas of responsibility follow:

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Phone: 867 – 966 – 3034
Fax: 867 – 966 – 3620
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Brad Wilson – Mayo – Stewart River sub-basin
Phone: 867 – 996 - 2415
Fax: 867 – 996 - 2829
Bwilson@yknet.yk.ca
Box 249, Mayo YT, Y0B 1M0

The City of Whitehorse has also entered a partnership with DFO and funds one Steward.

Sadie Bryan
Phone: 867-668-8347
Fax: 867-668-8395
sadie.bryan@city.whitehorse.yk.ca
2121 Second Av., Whitehorse YT, Y1A 1C2

One Steward is located in the Habitat and Enhancement Branch in Whitehorse. This position provides information support to the external Stewards, to the Dept. and to other agencies.

Kate Maddigan
Phone: 867 – 393 – 6703
Fax: 867 – 393 – 6737
Maddigank@pac.dfo-mpo.gc.ca
100-419 Range Road, Whitehorse Yukon, Y1A 3V1

The HCSP is coordinated by an Area Coordinator.

Al von Finster
Phone:867 – 393 – 6721
Fax: 867 – 393 – 6737
vonfinstera@pac.dfo-mpo.gc.ca
100-419 Range Road, Whitehorse Yukon, Y1A 3V1

All external Stewards are working closely with their respective communities on a wide variety of projects and activities to meet the objectives of the Program. These include but are not limited to restoration and enhancement applications to various funding sources, education, information transfer both from and to fisheries managers, and the basic building of community capacity. They are also active in a broad range of planning processes including, among others, Yukon River Sub-basin Restoration and Enhancement Planning, Yukon Land Use Planning, and various municipal planning processes.

As currently configured, the HCSP will end on March 31, 2003. Please visit the HCSP web site for additional information on the Program http://www.hcsp.org/.

Education Program

In 1999-2000, Fisheries and Oceans again supported the educational program **"Salmon in the Classroom"**. Curriculum material to support the material is available in all 26 Yukon schools, at

Education Program

In 1999-2000, Fisheries and Oceans again supported the educational program **"Salmon in the Classroom"**. Curriculum material to support the material is available in all 26 Yukon schools, at the Learning Resource Centre and through DFO. Incubation equipment and salmon eggs are also offered to all Yukon schools. In 1999-2000, teachers in 21 classrooms in nine Yukon communities chose to run classroom incubators as part of the program. Most schools received "eyed" chinook eggs that were incubated to this stage at the McIntrye Creek salmon incubation facility, which is run by the Whitehorse Correctional Centre. Schools along the Alaska Highway north of Whitehorse conducted a chum egg take and incubated green eggs. Schools incubated between 50 and 450 salmon eggs, with most receiving about 60 eggs. About 1500 resultant fry (aggregate about 73% survival) were released back into the Morley River, Kluane River, Tatchun Creek and the Takhini River.

Twenty-two schools plan to incubate salmon eggs in the upcoming (2000-2001) year.

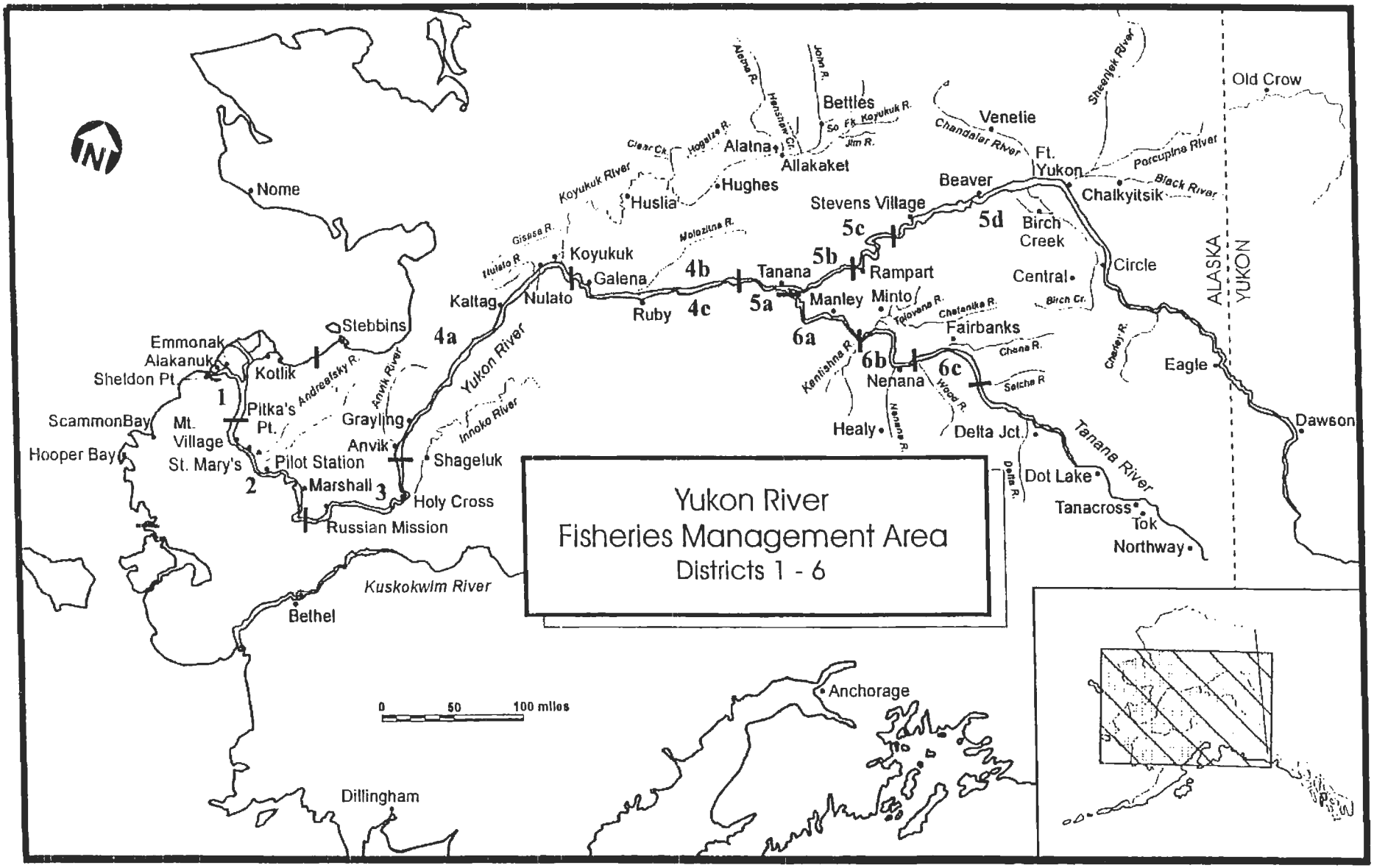


Figure 1. Map of the Alaska portion of the Yukon River Drainage.

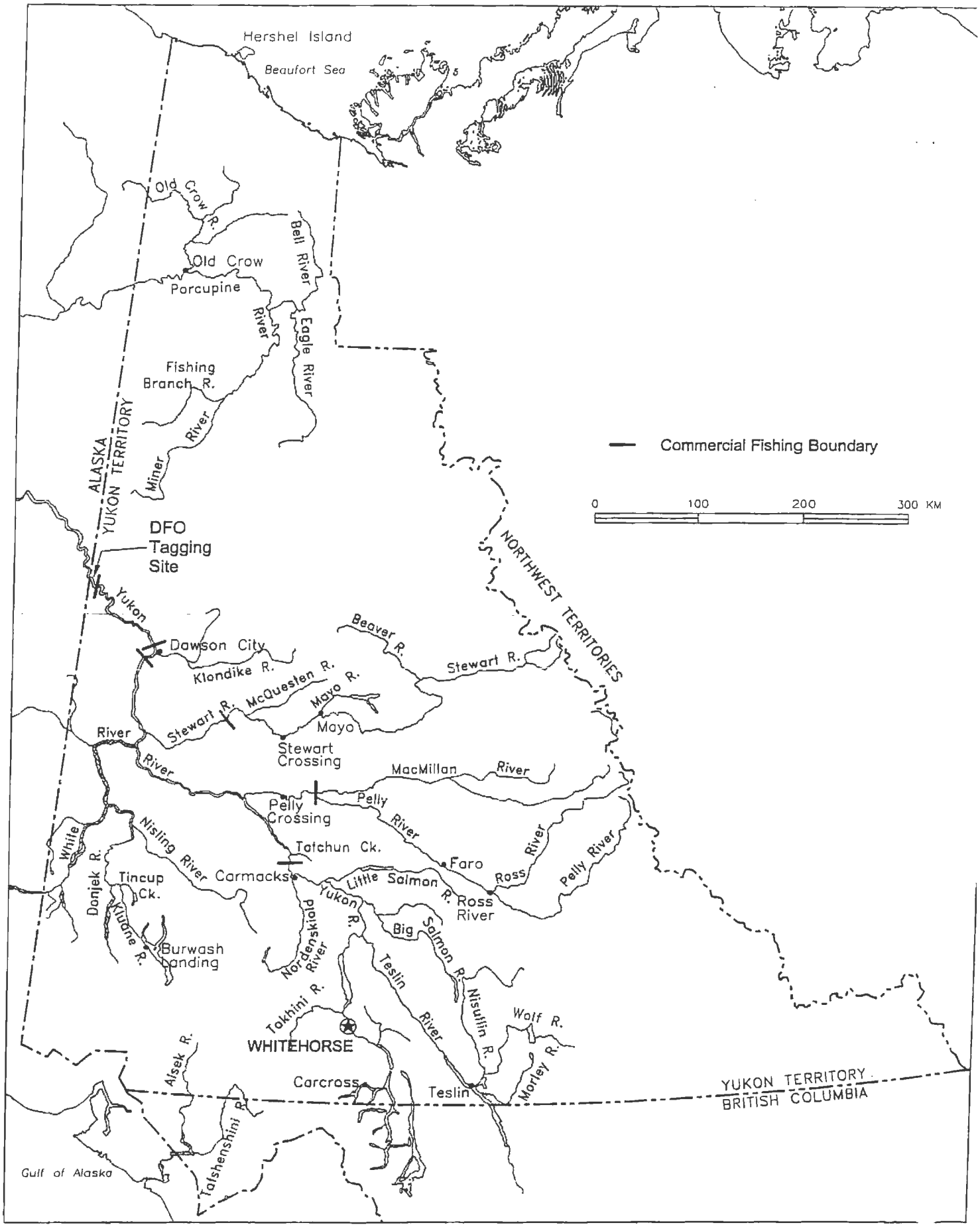


Figure 2. Map of the Canadian portion of the Yukon River showing commercial fishing boundaries

Table 1. Preliminary estimates of commercial salmon sales and estimated harvests in the Alaska portion of the Yukon River drainage, 2000 [a,b]

District Subdist	No of Fishermen [c]	Chinook			Summer Chum			Fall Chum			Coho			Total		
		Numbers	Roe	Harvest	Numbers	Roe	Harvest	Numbers	Roe	Harvest	Numbers	Roe	Harvest	Numbers	Roe	Harvest
1	350	4,735	0	4,735	3,315	0	3,315	-	-	-	-	-	-	8,050	0	8,050
2	214	3,783	0	3,783	3,309	0	3,309	-	-	-	-	-	-	7,092	0	7,092
Subtotal	562	8,518	0	8,518	6,624	0	6,624	-	-	-	-	-	-	15,142	0	15,142
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Total Lower Yukon	562	8,518	0	8,518	6,624	0	6,624	-	-	-	-	-	-	15,142	0	15,142
Anvik Rive	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-B,C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Subtotal District 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*0*
5-A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5-B,C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
5 D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Subtotal District 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
District 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Total Upper Yukon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Total Yukon Area	562	8,518	0	8,518	6,624	0	6,624	-	-	-	-	-	-	15,142	0	15,142

[a] Commercial sales reported in numbers of fish sold in the round and pounds of unprocessed roe sold by fishermen. Unless otherwise noted, estimated harvest is the number of fish sold in the round plus the estimated number of females harvested to produce the roe sold.

[b] Does not include Department test fish sales.

[c] Number of unique permits fished by district, subdistrict, or area. Area totals may not add up due to transfers between districts or subdistricts.

Table 2. Commercial sales of salmon and salmon roe in the Alaska portion of the Yukon River drainage, 1961-2000 [a]

Year	Chinook		Summer Chum		Fall Chum		Coho	
	Numbers	Roe (lbs.)	Numbers	Roe (lbs)	Numbers	Roe (lbs.)	Numbers	Roe (lbs.)
1961	119,664	-	0	-	42,461	-	2,855	-
1962	94,734	-	0	-	53,116	-	22,926	-
1963	117,048	-	0	-	0	-	5,572	-
1964	93,587	-	0	-	8,347	-	2,446	-
1965	118,098	-	0	-	23,317	-	731	-
1966	93,315	-	0	-	71,045	-	19,254	-
1967	129,656	-	10,935	-	38,274	-	11,047	-
1968	106,526	-	14,470	-	52,925	-	13,303	-
1969	91,027	-	61,966	-	131,310	-	15,720	-
1970	79,145	-	137,006	-	209,595	-	13,778	-
1971	110,507	-	100,090	-	189,594	-	13,226	-
1972	92,840	-	135,668	-	152,176	-	23,465	-
1973	75,353	-	285,509	-	232,090	-	49,644	-
1974	98,089	-	589,892	-	289,776	-	16,777	-
1975	63,838	-	710,295	-	275,009	-	2,546	-
1976	87,776	-	600,894	-	156,390	-	5,184	-
1977	96,757	-	534,875	-	257,986	-	38,863	-
1978	99,168	-	1,052,226	25,761	236,383	10,628	26,152	-
1979	127,673	-	779,316	40,217	359,946	18,466	17,165	-
1980	153,985	-	928,609	139,106	293,430	5,020	8,745	-
1981	156,706	-	1,003,556	189,068	466,451	11,285	23,651	-
1982	123,174	-	460,167	152,819	224,187	805	36,895	-
1983	146,904	-	742,463	149,999	302,598	5,064	13,157	-
1984	118,815	-	586,375	167,224	207,938	2,328	81,826	-
1985	145,476	-	514,900	248,625	267,302	2,525	57,521	-
1986	99,268	-	719,234	271,691	138,688	577	47,162	-
1987	133,558	-	439,854	121,968	0	0	0	-
1988	100,364	-	1,148,650	256,535	133,320	3,227	86,187	-
1989	104,198	-	955,806	288,549	266,206	14,749	81,548	-
1990	95,247	1,731	303,858	109,376	122,010	10,944	41,032	4,042
1991	104,878	3,829	349,113	141,976	230,852	19,395	103,180	4,299
1992	120,245	3,164	332,313	112,996	15,721	2,806	6,556	1,680
1993	93,550	2,014	96,522	22,962	0	0	0	0
1994	113,137	2,394	80,284	97,757	3,631	3,276	120	5,588
1995	122,728	5,357	259,774	290,737	250,733	32,502	45,939	2,229
1996	89,671	1,470	145,593	314,759	88,342	14,671	52,643	4,829
1997	112,841	3,225	95,242	83,267	56,713	1,194	35,320	0
1998	43,618	260	28,611	153	0	0	1	0
1999	69,275	1,096	29,389	24	20,371	0	1,601	0
2000	8,518	0	6,624	0	0	0	0	0
1995-99 Avg.	87,627	2,282	111,722	137,788	83,232	9,673	27,101	1,412

[a] Commercial sales reported in numbers of fish sold in the round and pounds of unprocessed roe sold by fishermen.

Table 3. Guideline harvest ranges and mid-points for commercial harvest of Yukon River chinook summer chum and fall chum salmon in Alaska, 2000.

Chinook Salmon

District or Subdistrict	Guideline Harvest Range [a]					
	Lower		Mid-Point		Upper	
	Numbers	Percent	Numbers	Percent	Numbers	Percent
1 and 2	60,000	89.1	90,000	91.6	120,000	92.9
3	1,800	2.7	2,000	2.0	2,200	1.7
4	2,250	3.3	2,550	2.6	2,850	2.2
5A, B, C	2,400	3.6	2,600	2.6	2,800	2.2
5D	300	0.4	400	0.4	500	0.4
6	600	0.9	700	0.7	800	0.6
Total	67,350	100.0	98,250	100.0	129,150	100.0

Summer Chum Salmon

District or Subdistrict	Guideline Harvest Range [b]					
	Lower		Mid-Point		Upper	
	Numbers	Percent	Numbers	Percent	Numbers	Percent
1 and 2	251,000	62.8	503,000	62.9	755,000	62.9
3	6,000	1.5	12,500	1.6	19,000	1.6
4A [c]	113,000	28.3	225,500	28.2	338,000	28.2
4B, C	16,000	4.0	31,500	3.9	47,000	3.9
5	1,000	0.3	2,000	0.3	3,000	0.3
6	13,000	3.3	25,500	3.2	38,000	3.2
Total	400,000	100.0	800,000	100.0	1,200,000	100.0

Anvik River Management Area Roe cap of 100,000 pounds [d]

Fall Chum Salmon

District or Subdistrict	Guideline Harvest Range [e]					
	Lower		Mid-Point		Upper	
	Numbers	Percent	Numbers	Percent	Numbers	Percent
1, 2, and 3	60,000	82.5	140,000	71.2	220,000	68.6
4B, C	5,000	6.9	22,500	11.4	40,000	12.5
5A, B, C	4,000	5.5	20,000	10.2	36,000	11.2
5D	1,000	1.4	2,500	1.3	4,000	1.2
6	2,750	3.8	11,625	5.9	20,500	6.4
Total	72,750	100.0	196,625	100.0	320,500	100.0

[a] The chinook salmon guideline harvest ranges have been in effect since 1981.

[b] Summer chum salmon guideline harvest ranges were established in February 1990 based on the average harvest shares from 1975-1989.

[c] Or the equivalent roe poundage of 61,000 to 183,000 pounds or some combination of fish and pounds of roe.

[d] The current Anvik River Management Area roe cap was established in March 1996.

[e] The current fall chum salmon guideline harvest ranges were established in 1990.

Table 4. Canadian weekly commercial catches of chinook and chum salmon in the Yukon River in Year 2000.

tatistic Week	Week Ending	Start Date	Finish Date	Days Fished	Number Fishing	Boat Days	Chinook Salmon	Chum Salmon	Coho Salmon
27	01-Jul			closed	0.0	0.0	0	0	0
28	08-Jul			closed	0.0	0.0	0	0	0
29	15-Jul			closed	0.0	0.0	0	0	0
30	22-Jul			closed	0.0	0.0	0	0	0
31	29-Jul			closed	0.0	0.0	0	0	0
32	05-Aug			closed	0.0	0.0	0	0	0
33	12-Aug			closed	0.0	0.0	0	0	0
34	19-Aug			closed	0.0	0.0	0	0	0
35	26-Aug			closed	0.0	0.0	0	0	0
36	02-Sep			closed	0.0	0.0	0	0	0
37	09-Sep			closed	0.0	0.0	0	0	0
38	16-Sep	15-Sep	16-Sep	1	8	0.0	0	1319	0
39	23-Sep			closed	0.0	0.0	0	0	0
40	30-Sep			closed	0.0	0.0	0	0	0
41	07-Oct			closed	0.0	0.0	0	0	0
42	14-Oct			closed	0.0	0.0	0	0	0
Dawson area subtotal						0.0	0	1319	0
Upriver commercial subtotal							0	0	
Total Commercial Harvest							0	1319	0
Chinook Test Fishery							760	6	0
Domestic Harvest							0	0	
Estimated Recreational Harvest								0	0
Aboriginal test fishery catch							3863	1791	
TOTAL UPPER YUKON HARVEST							4623	3116	0
Old Crow AF							na	na	na

Table 5. Salmon fishery projects conducted in the Alaskan portion of the Yukon River drainage in 2000.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Commercial Catch and Effort Assessment	Alaskan portion of the Yukon River drainage	document and estimate the catch and associated effort of the Alaskan Yukon River commercial salmon fishery via receipts (fish tickets) of commercial sales of salmon or salmon roe	June - Sept.	ADF&G	all aspects
Commercial Catch Sampling and Monitoring	Alaskan portion of the Yukon River drainage	determine age, sex, and size of salmon harvested in Alaskan Yukon River commercial fisheries; monitor Alaskan commercial fishery openings and closures	June - Sept	ADF&G ADPS	all aspects enforcement
Subsistence and Personal Use Catch and Effort Assessment	Alaskan portion of the Yukon River drainage	document and estimate the catch and associated effort of the Alaskan Yukon River subsistence salmon fishery via interviews, catch calendars, mail-out questionnaires, telephone interviews, and subsistence fishing permits, and of the personal use fishery personal use fishery permits	post-season	ADF&G	all aspects
Sport Catch, Harvest and Effort Assessment	Alaskan portion of the Yukon River drainage	document and estimate the catch, harvest, and associated effort of the Alaskan Yukon River sport fishery via post-season mail-out questionnaires	post-season	ADF&G	all aspects
Yukon River Salmon Stock Identification	Yukon River drainage	estimate chinook salmon stock composition of the various Yukon River drainage harvests through analyses of scale patterns, age compositions, and geographical distribution of catches and escapements,	ongoing	ADF&G DFO & USFWS	all aspects provide scale samples
		investigate the utility of nuclear genes, microsatellites, and SINE's in identifying U S /Canada fall chum salmon stocks	ongoing	USGS-BRD USFWS & ADF&G	lead agency
Yukon River Salmon Escapement Surveys and Sampling	Alaskan portion of the Yukon River drainage Nenana River drainage	estimate population size, or index the relative abundance, of chinook, chum, and coho salmon spawning escapements by aerial, foot, and boat surveys; estimate age, sex and size of selected tributary chinook, chum, and coho salmon spawning populations.	July - Nov Sept -Oct	ADF&G TCC/BSFA	all aspects conduct surveys
Hooper Bay Subsistence Fishing Monitor	90 miles south Yukon River's South Mouth	monitor summer chum and chinook salmon run timing and abundance using subsistence catch data	June-July	Hooper Bay Trad. Council USFWS	all aspects provide funding
Lower Yukon River Set Gillnet Test Fishing	South, Middle, and North mouths of the Yukon River delta, RM 20	index chinook, summer and fall chum, and coho salmon run timing and relative abundance using set gillnets. sample captured salmon for age, sex, size composition information.	June - Aug	ADF&G	all aspects
Mountain Village Drift Gillnet Test Fishing	mainstem Yukon River, RM 87	index run timing and relative abundance of fall chum and coho salmon using drift gillnets	July - Sept.	Asa'carsarmiut Trad Council	all aspects implementation with R & E
Yukon River Chinook Salmon Tagging and Telemetry Study	mainstem Yukon River, RM 161 and	provide information on run characteristics – including stock composition, run timing and migration patterns	June-July	ADF&G	all aspects
Marshall Drift Gillnet Test Fishing	mainstem Yukon River, RM 161 and 213	determine feasibility of using drift gillnets to index timing and relative abundance of chinook salmon run.	June - July	AVCP Marshall Traditional Council	all aspects implementation with R & E
East Fork Weir, Andreafsky River	mile 20 East Fork RM 124	estimate daily escapement, with age, sex and size composition, of chinook, summer chum, and coho salmon into the East Fork of the Andreafsky River	June - Sept	USFWS Yupiit of Andreafsky Algaaciq Tribal Council	all aspects partial funding from BSFA Aug -Sept
		determine feasibility of using video and time-lapse photography to improve escapement monitoring	July - Sept	USFWS	partial funding from R & E
Yukon River Sonar	Pilot Station, RM 123	estimate chinook, summer and fall chum, and coho salmon passage in the mainstem Yukon River	June - Sept.	ADF&G AVCP	all aspects

continued

Table 5. (page 2 of 3).

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Anvik River Sonar	mile 40 Anvik River, RM 358	estimate daily escapement of summer chum salmon to the Anvik River; estimate age, sex, and size composition of the summer chum salmon escapement	June - July	ADF&G	all aspects
Kaltag Creek Tower	mile 1 Kaltag Creek, RM 451	estimate daily escapement of chinook and summer chum salmon into Kaltag Creek; estimate age, sex, and size composition of the summer chum salmon escapement	June - July	City of Kaltag ACES BSFA	all aspects provided funding provided funding
Nulato River Tower	mile 3 Nulato River, RM 486	estimate daily escapement of summer chum and chinook salmon into the Nulato River; estimate age, sex, and size composition of the summer chum salmon escapement	June - July	NTC ADF&G BSFA	all aspects provided funding provide funding
Gisasa River Weir	mile 3 Gisasa River, Koyukuk River drainage, RM 567	estimate daily escapement of chinook and summer chum salmon into the Gisasa River; estimate age, sex, and size composition of the chinook and summer chum salmon escapements.	June - July	USFWS	all aspects
Clear Creek Tower	mile 0 Clear Creek, Hogotza River drainage, Koyukuk River drainage, RM ~ 780	estimate daily escapement of chinook and summer chum salmon into Clear Creek; estimate age, sex, and size composition of the summer chum salmon escapement	June - Aug	TCC BSFA	all aspects
Henshaw Creek Weir	mile 0 Henshaw Creek, RM 970	estimate daily escapement of chinook and summer chum salmon into Henshaw Creek; estimate age, sex, and size composition of the salmon escapement	June - July	TCC BSFA	all aspects implementation with R & E
Chandalar River Sonar	mile 14 Chandalar River, RM 996	use split-beam sonar equipment to estimate fall chum salmon escapement	Aug. - Sept	USFWS	all aspects
Sheenjek River Sonar	mile 6 Sheenjek River, Porcupine River drainage, RM 1,060	estimate daily escapement of fall chum salmon into the Sheenjek River; estimate age, sex, and size composition of the fall chum salmon escapement	Aug - Sept	ADF&G	all aspects
Kaltag Village Drift Gill Net Test Fishing	Mainstem Yukon River Kaltag, RM 451	determine feasibility of using drift gillnets to index timing and relative abundance of fall chum and coho salmon runs.	July - Sept	City of Kaltag	all aspects implementation with R & E
Middle Yukon River Chinook Sampling Project	Mainstem Yukon River Kaltag, RM 451	estimate age, sex, and size composition of chinook salmon harvested in middle Yukon River subsistence fisheries	June - July	City of Kaltag	all aspects implementation with R & E
Nenana River Escapement Surveys	Nenana River drainage, above RM 860	aerial and ground surveys for numbers and distribution of coho and chum salmon in ten tributaries of the Nenana below Healy Creek	Sept - Oct	BSFA	all aspects funding
Tanana Village South bank Yukon River Fish Wheel, Test Fishing	Mainstem Yukon River Tanana, RM 695	index the timing of chum and coho salmon on the south bank of the Yukon River bound for the Tanana River drainage, using test fish wheels South bank test fish wheel also used for Toklat CWT recovery	Aug - Sept	ADF&G BSFA	all aspects partial funding R & E partial funding
		determine feasibility of using stored video images as an alternative to live boxes to estimate catch per unit effort on fishwheels	July - Sept	USFWS	implementation with R & E

continued

Table 5. (page 3 of 3).

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Tanana River Fish Wheel Test Fishing	mainstem Tanana River Nenana, RM 860	index the timing of chinook summer chum, fall chum, and coho salmon runs using test fish wheels.	June - Sept	ADF&G BSFA	all aspects partial funding
Tanana River Tagging and recovery	mainstem Tanana River between RM 793 and 860	estimate the population size of the Tanana River (including the Kantishna River drainage) fall chum salmon run using mark-recapture methodology;	Aug - Sept.	ADF&G BSFA	all aspects provided partial funding
Beaver Creek Weir	mile 200 Beaver Creek Yukon River, RM 932	estimate daily escapement of chinook and chum salmon into the upper portion of Beaver Creek	July - Sept	BLM	all aspects
Toklat River Ground Survey	Toklat River, between RM 848 and 853	estimate fall chum spawning escapement in Toklat Springs and vicinity	mid-Oct	ADF&G	all aspects
Chena River Tower	mile 1 Chena River, Tanana River drainage, RM 921	estimate daily escapement of chinook and summer chum salmon into the Chena River	July - Aug.	ADF&G	all aspects
Salcha River Tower	mile 2 Salcha River, Tanana River drainage, RM 967	estimate daily escapement of chinook and summer chum salmon into the Salcha River.	July - Aug	BSFA	all aspects implementation with R & E
Yukon River Chum Salmon Ecology Study	Chena River and Bluff Cabin Slough	study spawning habitat and factors influencing freshwater survival	ongoing	USGS-BRD	all aspects
Ichthyophonus hoferi Feasibility Study	Emmonak, RM 20, Tanana Village, RM 695	determine feasibility of collecting samples to estimate infection rate of *Ichthyophonus hoferi* fungus, and its effects on Yukon River chinook salmon.	June - July	BSFA	all aspects

Agency Acronyms:

ACES	= Alaska Cooperative Extension Service
ADF&G	= Alaska Department of Fish and Game
ADPS	= Alaska Department of Public Safety
AVCP	= Association of Village Council Presidents, Inc
BSFA	= Bering Sea Fishermen's Association
BLM	= Borough of Land Management
CATG	= Council of Athabascan Tribal Governments
DFO	= Department of Fisheries and Oceans (Canada)
NMFS	= National Marine Fisheries Service
NTC	= Nulato Tribal Council
TCC	= Tanana Chiefs Conference, Inc
USFWS	= United States Fish and Wildlife Service
USGS - BRD	= United States Geological Survey - Biological Resource Division
YRDFA	= Yukon River Drainage Fisheries Association

Table 6. List of harvest/escapement monitoring and incubation/rearing projects involving salmon in the Canadian portion of the Yukon River drainage in 2000.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Yukon Mark-Recapture and Chinook Test Fishery	downstream of the Stewart River	- to obtain population, escapement and harvest rate estimates of chinook and chum salmon in the Canadian section of the mainstem Yukon River; - to collect stock ID, age, size, sex composition data; - to contribute to inseason run forecasting.	June - Oct	DFO YSC, YRCFA, THF	all aspects chinook test fishery
Commercial Catch Monitoring	near Dawson City	- to determine weekly catches and effort in the Canadian commercial fishery; recovery of tags.	July - Oct	DFO	all aspects
Aboriginal Catch Monitoring	Yukon communities	- to determine weekly catches and effort in the aboriginal fishery; recovery of tags; - to implement components of the UFA.	July - Oct	LGL, Yukon First Nations, DFO	joint project
Harvest Sampling	downstream of the Stewart River;	- to obtain age, size, sex composition of commercial, aboriginal, and test fish catches; - to sample for coded wire tags - to sample for Icthypphonus hoheri in Dawson area	July - Oct	DFO, LGL	joint project
DFO Escapement Index Surveys	chinook and chum index streams	- to obtain escapement counts in index spawning areas.	August - Nov	DFO	all aspects
Escapement Surveys	throughout upper Yukon R. drainage	- to conduct mobile surveys (on foot or by helicopter) - to enumerate chinook returns to Flat Creek, Tincup Creek, Jennings, Gladys, Swift and Morley rivers and other tributaries	July - August	various R&E Fund recipients including Yukon First Nations, consultants, and individuals	all aspects
Fishing Branch Weir	Fishing Branch Rive	- to enumerate chum and chinook salmon returning to the Fishing Branch River and obtain age, size, tag and sex composition data.	July - Oct	VGFN DFO	chinook season chum season
Whitehorse Rapids Fishway	Whitehorse	- to enumerate wild and hatchery reared chinook returns to the Whitehorse area and obtain age, size, sex and tag composition data.	July - August	YFGA	all aspects
Chandindu River Weir	near Dawson City	- enumerate chinook returns to Chandindu River and obtain age, size, sex and tag composition data.	July - August	YRCFA	all aspects
Tatchun Creek Weir	near Carmacks	- enumerate chinook returns to Tatchun Creek and obtain age, size, sex and tag composition data.	July - August	QC	all aspects
Blind Creek Weir	near Faro	- enumerate chinook returns to Blind Creek and obtain sex and tag composition data.	July - August	RRDC	all aspects

continued

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Escapement Sampling	various tributaries	- to obtain age and size composition - to sample for Icthypphonus hoheri in hatchery samples	August - Oct	DFO ADF&G/U. of Wash.	all aspects
Upper Yukon R. and Porcupine R Radio Tag Tracking	- upper Yukon River: mstm Yukon R. near Minto and Kluane R. - Porcupine R. drainage	- to track chinook salmon tagged with transmitters at Rampa AK. using fixed tracking stations	May - October	DFO, NMFS, USFWS	joint project
Whitehorse Rapids Fish Hatchery and Coded-wire Tag Project	Whitehorse	- to incubate ~200K chinook eggs obtained at the Whitehorse Fishway; - to rear fry until spring, then mark, tag, and release upstream of Whitehorse hydroelectric facility.	ongoing	YFGA DFO	all aspects coded-wire tagging
MacIntyre Incubation Box and Coded-wire Tag Project	Whitehorse	- to incubate up to 120K chinook fry obtained from the Takhini River and/or Tatchun Creek; - to rear fry to taggable size, then mark, tag, and release at natal site.	ongoing	DFO WCC	technical support field work, project monitoring
Mayo Area Pilot Incubation Projects	3 ground water springs in the Mayo area	to identify a site for small scale egg incubation near Mayo	ongoing	DFO NND FN	technical support field work, project monitoring

Acronyms:

DFO	= Department of Fisheries and Oceans Canada
NMFS	= National Marine Fisheries Service
QC	= Quixote Consulting
RRDC	= Ross River Dena Council
THFN	= Tr'ondek Hwech'in First Nation
UFA	= Umbrella Final Agreement
USFWS	= U.S. Fish and Wildlife Service
VGFN	= Vuntut Gwitchin First Nation
WCC	= Whitehorse Correctional Centre
YFGA	= Yukon Fish and Game Association
YRCFA	= Yukon River Commercial Fishers Association
YSC	= Yukon Salmon Committee
NND FN	Nacho Nyak Dun First Nation

Table 7 Summary of Releases of Chinook Salmon from Yukon Territory In-stream Incubation/Rearing Sites 1991-2000.

PROJECT	SPECIES	BROOD YEAR	STOCK	MARK	STAGE	RELEASE SITE	START DATE	END DATE	# TAGGED	# AD ONLY	# UN-MARKED	TOTAL REL.	WT. (GM)
Klondike R	Chinook	1990	Tatchun R	0201010212	Spring Fry	Tatchun R	91/06/28	91/06/28	13593	21	650	14264	0.74
Klondike R	Chinook	1990	Tatchun R	0201010209	Spring Fry	Tatchun R	91/06/28	91/06/28	15247	173	750	16170	0.74
Klondike R	Chinook	1991	Tatchun R	180645	Spring Fry	Tatchun R	/ /	92/08/31	11734	0	817	12551	2.47
Klondike R	Chinook	1991	Tatchun R	023356	Spring Fry	Tatchun R	/ /	92/08/31	6453	0	852	7305	2.47
Klondike R	Chinook	1991	Tatchun R	180644	Spring Fry	Tatchun R	/ /	92/08/31	11585	0	320	11905	2.47
Klondike R	Chinook	1991	Yukon R	NOCN9148	Spring Fry	Pothole Lk	92/06/	92/06/	0	0	1500	1500	0
Klondike R	Chinook	1993	Klondike R Nor	0201010503	Spring Fry	Klondike R	94/06/30	94/06/30	6174	10	54	6238	0.88
Klondike R	Chinook	1993	Tatchun R	0201010407	Spring Fry	Tatchun R	94/06/30	94/06/30	12077	246	71	12394	0.99
Klondike R	Chinook	1993	Tatchun R	0201010505	Spring Fry	Tatchun R	94/06/30	94/06/30	9982	0	61	10043	0.99
Klondike R	Chinook	1994	Klondike R Nor	0201010603	Spring Fry	Klondike R	95/07/04	95/07/04	2159	11	190	2360	0.75
Klondike R	Chinook	1994	Klondike R Nor	0201010602	Spring Fry	Klondike R	95/07/04	95/07/04	1809	16	56	1881	0.75
Klondike R	Chinook	1994	Tatchun R	0201010511	Spring Fry	Tatchun R	95/07/04	95/07/04	12431	100	686	13217	0.81
Klondike R	Chinook	1994	Tatchun R	0201010515	Spring Fry	Tatchun R	95/07/04	95/07/04	2490	33	177	2700	0.81
Klondike R	Chinook	1994	Tatchun R	0201010601	Spring Fry	Tatchun R	95/07/04	95/07/04	1476	19	155	1650	0.81
Klondike R	Chinook	1994	Tatchun R	0201010513	Spring Fry	Tatchun R	95/07/04	95/07/04	11649	238	413	12300	0.81
Klondike R	Chinook	1995	Klondike R Nor	0201010408	Spring Fry	Klondike R	96/06/22	96/06/22	11423	1707	0	13130	0.76
Mayo Rive	Chinook	1991	Mayo R	NOCN9147	Spring Fry	Mayo R	92/06/	92/06/	0	0	13000	13000	0
Mayo Rive	Chinook	1992	Mayo R	NOCN9292	Spring Fry	Mayo R	93/07/	93/07/	0	0	500	500	0
McIntyre C	Chinook	1990	Takhini R	023355	Fall Fry 5-	Takhini R	91/09/13	91/09/13	7967	80	38	8085	3.2
McIntyre C	Chinook	1990	Takhini R	023354	Fall Fry 5-	Takhini R	91/09/13	91/09/13	10789	109	101	10999	3.2
McIntyre C	Chinook	1991	Takhini R	0201010308	Spring Fry	Flat Cr	/ /	92/07/04	12141	143	3425	15709	0.98
McIntyre C	Chinook	1991	Takhini R	0201010309	Spring Fry	Flat Cr	/ /	92/07/04	13102	466	1398	14966	0.98
McIntyre C	Chinook	1991	Takhini R	0201010310	Spring Fry	Flat Cr	/ /	92/07/04	4955	261	601	5817	0.98
McIntyre C	Chinook	1992	Klondike R Nor	0201010404	Spring Fry	Klondike R	93/07/01	93/07/01	12832	240	144	13216	1.14
McIntyre C	Chinook	1992	Klondike R Nor	0201010405	Spring Fry	Klondike R	93/07/01	93/07/01	7546	256	167	7969	1.14
McIntyre C	Chinook	1992	Takhini R	023424	Spring Fry	Flat Cr	93/08/17	93/08/17	9532	823	95	10450	2.71
McIntyre C	Chinook	1992	Takhini R	023423	Spring Fry	Flat Cr	93/08/17	93/08/17	9822	850	218	10890	2.71
McIntyre C	Chinook	1992	Takhini R	181454	Spring Fry	Flat Cr	93/08/17	93/08/17	10925	567	227	11719	2.71
McIntyre C	Chinook	1992	Takhini R	181453	Spring Fry	Flat Cr	93/08/17	93/08/17	10858	865	226	11749	2.71
McIntyre C.	Chinook	1992	Takhini R	020217	Spring Fry	Flat Cr	93/08/17	93/08/17	2291	114	37	2442	2.71
McIntyre C	Chinook	1992	Takhini R	023422	Spring Fry	Flat Cr	93/08/17	93/08/17	10355	314	40	10709	2.71
McIntyre C	Chinook	1992	Tatchun R	0201010402	Spring Fry	Tatchun R	93/06/17	93/06/17	4654	633	335	5622	0.76
McIntyre C	Chinook	1993	Takhini R	181751	Spring Fry	Flat Cr	94/08/26	94/08/31	7410	46	222	7678	2.6
McIntyre C	Chinook	1993	Takhini R	181750	Spring Fry	Flat Cr	94/08/26	94/08/31	11227	40	87	11354	2.6
McIntyre C	Chinook	1993	Takhini R	181749	Spring Fry	Flat Cr	94/08/26	94/08/31	11071	159	142	11372	2.6
McIntyre C	Chinook	1993	Takhini R	181748	Spring Fry	Flat Cr	94/08/26	94/08/31	11375	0	104	11479	2.6
McIntyre C	Chinook	1993	Takhini R	181752	Spring Fry	Flat Cr	94/08/26	94/08/31	10668	21	198	10887	2.6
McIntyre C	Chinook	1993	Takhini R	020216	Spring Fry	Takhini R	94/08/30	94/08/30	9343	271	36	9650	2.8
McIntyre C	Chinook	1993	Takhini R	020163	Spring Fry	Takhini R	94/08/30	94/08/30	10899	222	62	11183	2.8
McIntyre C	Chinook	1994	Takhini R	0201010415	Spring Fry	Takhini R	95/08/14	95/08/14	9887	0	410	10297	2.2
McIntyre C	Chinook	1994	Takhini R	0201010413	Spring Fry	Takhini R	95/08/14	95/08/14	14452	0	365	14817	2.2
McIntyre C	Chinook	1994	Takhini R	0201010412	Spring Fry	Flat Cr	95/08/14	95/08/14	14193	59	281	14533	2.2
McIntyre C	Chinook	1994	Takhini R	0201010414	Spring Fry	Flat Cr	95/08/14	95/08/14	13586	130	295	14011	2.2
McIntyre C	Chinook	1995	Takhini R	0201010508	Spring Fry	Takhini R	96/08/12	96/08/12	15731	251	496	16478	2.1
McIntyre C	Chinook	1995	Takhini R	0201010509	Spring Fry	Takhini R	96/08/12	96/08/12	8085	41	293	8419	2.1
McIntyre C	Chinook	1995	Takhini R	0201010510	Spring Fry	Flat Cr	96/08/07	96/08/07	10727	65	170	10962	2.01
McIntyre C	Chinook	1995	Tatchun R	0201010210	Spring Fry	Tatchun R	96/06/27	96/06/27	14530	49	62	14641	0.81
McIntyre C	Chinook	1995	Tatchun R	0201010211	Spring Fry	Tatchun R	96/06/27	96/06/27	13526	91	294	13911	0.81
McIntyre C	Chinook	1996	Takhini R	0201010614	Spring Fry	Flat Cr	97/07/02	97/07/04	15622	158	382	16162	0.8
McIntyre C	Chinook	1996	Takhini R	0201010406	Spring Fry	Flat Cr	97/07/02	97/07/04	14845	37	280	15162	0.8
McIntyre C	Chinook	1996	Tatchun R	0201010703	Spring Fry	Tatchun R	97/06/27	97/06/27	1521	15	148	1684	1
McIntyre C	Chinook	1997	Tatchun R	0201010608	Spring Fry	Tatchun R	98/06/19	98/06/19	9284	150	74	9508	1.1
McIntyre C	Chinook	1997	Tatchun R	0201010609	Spring Fry	Tatchun R	98/06/19	98/06/19	10318	211	188	10717	1.1
McIntyre C	Chinook	1997	Tatchun R	0201010702	Spring Fry	Tatchun R	98/06/19	98/06/19	2536	52	0	2588	1.1
McIntyre C	Chinook	1997	Takhini R	0201010709	Spring Fry	Flat Cr	98/06/22	98/06/22	11374	115	115	11604	1.1
McIntyre C	Chinook	1997	Takhini R	0201010611	Spring Fry	Takhini R	98/06/23	98/06/23	12930	334	118	13385	1.1
McIntyre C	Chinook	1997	Takhini R	0201010610	Spring Fry	Takhini R	98/06/23	98/06/23	12186	37	115	12338	1.1
McIntyre C	Chinook	1997	Takhini R	0201010708	Spring Fry	Takhini R	98/06/23	98/06/23	12341	253	148	12742	1.1
McIntyre C	chinook	1998	Tatchun Cr	0201010612	Spring Fry	Talchun		99/07/08	10363	0	67	10430	1.4
McIntyre C	chinook	1998	Tatchun Cr	0201010613	Spring Fry	Talchun		91/07/08	4733	0	82	4815	1.4
McIntyre C	chinook	1998	Takhini R	201010710	Spring Fry	Takhini R.		99/07/14	13753	28	148	13929	1.4
McIntyre C	chinook	1998	Takhini R	201010711	Spring Fry	Flat Cr.		99/07/15	11273	23	206	11502	1.4
McIntyre C	chinook	1999	Takhini River	201010707	Spring Fry	Flat Cr.		23/Jun/00	11332.5	114.47	219	11666	0.8
McIntyre C	chinook	1999	Takhini River	201010712	Spring Fry	Flat Cr.		23/Jun/00	12246	0	214	12460	0.8
McIntyre C	chinook	1999	Takhini River	201010604	Spring Fry	Takhini River		24/Jun/00	11105	0	147	11252	0.9
McIntyre C	chinook	1999	Takhini River	201010605	Spring Fry	Takhini River		24/Jun/00	12044	0	88	12132	0.9
McIntyre C	chinook	1999	Takhini River	201010606	Spring Fry	Takhini River		24/Jun/00	4561	0	0	4561	0.9
McIntyre C	chinook	1999	Tatchun Cr	201010705	Spring Fry	Tatchun		19/Jun/00	12239.3	187.66	409	12836	1.2
McIntyre C	chinook	1999	Tatchun Cr	0201010706	Spring Fry	Tatchun		19/Jun/00	987.03	9.97	0	997	1.2

Table 8. Summary of releases and recoveries of Coded-wire Tagged Chinook Salmon from Whitehorse Hatchery, 1985 - 2000

Release Location	Release Date[a]	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss[a]	Days [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Michie	25-May-85	023248	26670	518			27188		0	
Michie	25-May-85	023226	28269	518			28787		0	
Michie	25-May-85	023247	43325	518			43843		0	
Wolf	1985	no-clip	0	0			0		10520	10520
SUM	1985		98264	1554			99818		10520	110338
Michie	1986	023731	77170				77170		1000	78170
Wolf	1986						0		5720	5720
SUM	1986		77170				77170		6720	83890
Michie	05-Jun-87	024812	47644	1361	0.028	b	49005	2.50	9598	58603
Michie	05-Jun-87	024813	49344	808	0.016	b	50152	2.50	9141	59293
Michie	05-Jun-87	024814	51888	559	0.011	b	52447	2.50	9422	61869
Michie	05-Jun-87	024815	43367	2066	0.045	b	45433	2.50	7868	53301
Michie	05-Jun-87	024258	25945	245	0.009	b	26190	2.50	4171	30361
Wolf	30-May-87	024259	26752	123	0.005	b	26875	2.50	422	27297
SUM	1987		245340	5162			250502		41216	291718
Michie	10-Jun-88	025549	77670	1991		15	79661	2.80	84903	164564
Michie	10-Jun-88	025550	78013	1592		11	79605	2.70	85288	164893
Wolf	05-Jun-88	no-clip	0	0			0		25986	25986
SUM	1988		155683	3583			159266		196177	355443
Wolf	1989	no-clip	0	0			0		22388	22388
Michie	06-Jun-89	026004	26161	326	0.015		26487	2.30	0	26487
Michie	06-Jun-89	026005	24951	128	0.004		25079	2.30	0	25079
Michie	06-Jun-89	026006	25098	291	0.018		25389	2.40	0	25389
Michie	06-Jun-89	026007	25233	156	0.0008		25389	2.20	95724	121113
Fishway	06-Jun-89	026008	25194	357	0.013		25551	2.70	0	25551
Fishway	06-Jun-89	026009	25190	351	0.0125		25541	2.70	0	25541
SUM	1989		151827	1609			153436		118112	271548
Wolf	06-Jun-90	no-clip	0	0			0		11969	11969
Michie	02-Jun-90	020238	24555	501	0.02		25056	2.30	0	25056
Michie	02-Jun-90	020239	24345	753	0.03		25098	2.30	0	25098
Fishway	02-Jun-90	020260	24508	501	0.0200		25009	2.20	0	25009
Fishway	02-Jun-90	020263	25113	254	0.01		25367	2.20	0	25367
SUM	1990		152521	2009			154530		11969	166499
Wolf	08-Jun-91	180322	49477	793	0.015		50270	2.30	0	50270
Fishway	06-Jun-91	180323	52948	193	0.0025		53141	2.30	0	53141
Michie	06-Jun-91	180324	50020	176	0.0025		50196	2.30	87348	137544
SUM	1991		152445	1162			153607		87348	240955
Wolf	04-Jun-92	180829	48239	0	0		48239	2.40	0	48239
Fishway	04-Jun-92	180828	49356	99	0.002		49455	2.30	0	49455
Michie	04-Jun-92	180830	52946	643	0.012		53589	2.20	249166	302755
SUM	1992		150541	742			151283		249166	400449
Wolf	06-Jun-93	181215	50248	0	0		50248	2.30	0	50248
Fishway	06-Jun-93	181216	49957	434	0.009		50391	2.30	0	50391
Michie	06-Jun-93	181217	50169	0	0		50169	2.30	290647	340816
SUM	1993		150374	434			150808		290647	441455
Wolf	02-Jun-94	181427	50155	270	0.0053		50425	2.30	0	50425
Michie	02-Jun-94	181428	50210	127	0.0002		50337	2.30	158780	209117
Fishway	02-Jun-94	181429	50415	125	0.0002		50540	2.30	0	50540
SUM	1994		150780	522			151302		158780	310082
Wolf	06-Jun-95	181246	10067	164	0.0163	3	10231	1.67	0	10231
Wolf	06-Jun-95	181247	9122	0	0	3	9122	1.53	0	9122
Michie	06-Jun-95	181826	25231	337	0.0134	3	25568	2.47	4552	30120
Michie	06-Jun-95	181827	25187	141	0.0056	3	25328	2.33	0	25328
SUM	1995		69607	642			70249		4552	74801
Wolf	26-May-96	18748	10131	102	0.001	5	10233	2.30	0	10233
Fox	04-Jun-96	182823	35452	0	0	5	35452	2.43	0	35452
Byng	04-Jun-96	181041	25263	516	0.002	5	25779	2.37	0	25779
Michie	05-Jun-96	183345	50082	1022	0.002	5	51104	2.51	0	51104
Michie	05-Jun-96	183346	50260	508	0.001	5	50768	2.43	0	50768
Michie	05-Jun-96	183347	49985	505	0.001	5	50490	2.32	0	50490
Judas	04-Jun-96	183348	49798	1016	0.002	5	50814	2.43	0	50814
McClintock	04-Jun-96	183349	49991	302	0.001	5	50293	2.27	0	50293
SUM	1996		320962	3971			324933		0	324933

continued

Table 8. (page 2 of 2).

Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss*	Days [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Wolf	01-Jun-97	182325	14850	150		2	15000	2.30	0	15000
Wolf	01-Jun-97	182326	20334	0		4	20334		0	20334
Wolf	08-Jun-97	182906	10158	0		8	10158		0	10158
Fox	11-Jun-97	182554	25242	0		3	25242	2.43	0	25242
Fox	11-Jun-97	182555	24995	253		3	25248		0	25248
Byng	11-Jun-97	182907	10029	0		1	10029	2.37	0	10029
Byng	11-Jun-97	182905	10155	0		1	10155		0	10155
Michie	11-Jun-97	182859	49657	502		3	50159	2.51	0	50159
Michie	11-Jun-97	182860	50130	0		3	50130	2.43	0	50130
Judas	07-Jun-97	182327	19951	202		3/7	20153	2.43	0	20153
Judas	11-Jun-97	182553	25146	0		11	25146	2.43	0	25146
McClintock	11-Jun-97	182551	25399	0		3	25399	2.27	0	25399
McClintock	11-Jun-97	182552	24792	251		3	25043		0	25043
SUM	1997		320838	3568			324406		0	324406
Michie	12-Jun-98	184122	49243	1004	0.02	5	50247	2.84	0	50247
Michie	12-Jun-98	184121	49197	1004	0.02	5	50201	2.81	0	50201
Byng	12-Jun-98	183160	24518	1022	0.04	5	25540	3.00	0	25540
McClintock	12-Jun-98	184043	49810	503	0.01	5	50313	2.76	0	50313
Judas	13-Jun-98	025417	19018	1432	0.07	5	20450	2.55	0	20450
Judas	12-Jun-98	183159	25331	256	0.01	5	25587	2.60	0	25587
Wolf	06-Jun-98	021958	10104	421	0.04	5	10525	1.95	0	10525
Wolf	04-Jun-98	024606	34813	710	0.02	5	35523	2.63	0	35523
SUM	1998		261824	5952			267936		0	267936
Michie	06-Jun-99			80393			0	3.13	0	80393
Byng	06-Jun-99			64430			0	2.92	0	64430
McClintock	06-Jun-99			64169			0	2.95	0	64169
Wolf	06-Jun-99			31048			0	3.07	0	31048
SUM	1999			240040			0		0	240040
Michie	08-Jun-00	183128	25114	254	0.01	5	25368	2.80	0	25368
Michie	08-Jun-00	183129	25037	253	0.01	5	25290	2.80	0	25290
Michie	08-Jun-00	184303	10907	110	0.01	5	11017	2.84	0	11017
McClintock	08-Jun-00	181354	25041	254	0.01	5	25295	2.70	0	25295
McClintock	08-Jun-00	181355	25016	253	0.01	5	25269	2.68	0	25269
Wolf	04-Jun-00	182353	25071	253	0.01	5	25324	2.67	0	25324
Wolf	04-Jun-00	182354	25012	254	0.01	5	25266	2.40	0	25266
SUM	2000		161198	1631			162829		0	162829

a: Tag loss measured over 5 days unless indicated otherwise.
b: unknown period.
c: usually corresponds to "tagged" category on MRP release forms
Non-CWT groups not recorded, 1985-1986.
CWT Data recorded from CWT release sheets 1989-94.
CWT Data prior to 1987 not verified against SEP records.
* release year = brood year + 1

ATTACHMENT I

HISTORICAL YUKON RIVER SALMON CATCH AND ESCAPEMENT DATABASE

Attachment Table 1. Alaskan and Canadian total utilization of Yukon River chinook, chum and coho salmon, 1903-2000.

	Alaska [a, b]			Canada [c]			Total		
Year	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total
1903				4,666		4,666	4,666		4,666
1904									
1905									
1906									
1907									
1908				7,000		7,000	7,000		7,000
1909				9,238		9,238	9,238		9,238
1910									
1911									
1912									
1913				12,133		12,133	12,133		12,133
1914				12,573		12,573	12,573		12,573
1915				10,466		10,466	10,466		10,466
1916				9,566		9,566	9,566		9,566
1917									
1918	12,239	1,500,065	1,512,304	7,066		7,066	19,305	1,500,065	1,519,370
1919	104,822	738,790	843,612	1,800		1,800	106,622	738,790	845,412
1920	78,467	1,015,655	1,094,122	12,000		12,000	90,467	1,015,655	1,106,122
1921	69,646	112,098	181,744	10,840		10,840	80,486	112,098	192,584
1922	31,825	330,000	361,825	2,420		2,420	34,245	330,000	364,245
1923	30,893	435,000	465,893	1,833		1,833	32,726	435,000	467,726
1924	27,375	1,130,000	1,157,375	4,560		4,560	31,935	1,130,000	1,161,935
1925	15,000	259,000	274,000	3,900		3,900	18,900	259,000	277,900
1926	20,500	555,000	575,500	4,373		4,373	24,873	555,000	579,873
1927		520,000	520,000	5,366		5,366	5,366	520,000	525,366
1928		670,000	670,000	5,733		5,733	5,733	670,000	675,733
1929		537,000	537,000	5,226		5,226	5,226	537,000	542,226
1930		633,000	633,000	3,660		3,660	3,660	633,000	636,660
1931	26,693	565,000	591,693	3,473		3,473	30,166	565,000	595,166
1932	27,899	1,092,000	1,119,899	4,200		4,200	32,099	1,092,000	1,124,099
1933	28,779	603,000	631,779	3,333		3,333	32,112	603,000	635,112
1934	23,365	474,000	497,365	2,000		2,000	25,365	474,000	499,365
1935	27,665	537,000	564,665	3,466		3,466	31,131	537,000	568,131
1936	43,713	560,000	603,713	3,400		3,400	47,113	560,000	607,113
1937	12,154	346,000	358,154	3,746		3,746	15,900	346,000	361,900
1938	32,971	340,450	373,421	860		860	33,831	340,450	374.281
1939	28,037	327,650	355,687	720		720	28,757	327,650	356,407
1940	32,453	1,029,000	1,061,453	1,153		1,153	33,606	1,029,000	1,062,606
1941	47,608	438,000	485,608	2,806		2,806	50,414	438,000	488,414
1942	22,487	197,000	219,487	713		713	23,200	197,000	220,200
1943	27,650	200,000	227,650	609		609	28,259	200,000	228,259
1944	14,232		14,232	986		986	15,218		15,218
1945	19,727		19,727	1,333		1,333	21,060		21,060
1946	22,782		22,782	353		353	23,135		23,135
1947	54.026		54,026	120		120	54,146		54,146
1948	33,842		33,842				33,842		33,842
1949	36,379		36,379				36,379		36,379
1950	41,808		41,808				41,808		41,808
1951	56,278		56,278				56,278		56,278
1952	38,637	10,868	49,505				38,637	10,868	49,505
1953	58,859	385,977	444,836				58,859	385,977	444,836
1954	64,545	14,375	78,920				64,545	14,375	78,920
1955	55,925		55,925				55,925		55,925
1956	62,208	10,743	72,951				62,208	10,743	72,951
1957	63,623		63,623				63,623		63,623
1958	75,625	337,500	413,125	11,000	1,500	12,500	86,625	339,000	425,625
1959	78,370		78,370	8,434	3,098	11,532	86,804	3,098	89,902
1960	67,597		67,597	9,653	15,608	25,261	77,250	15,608	92,858

continued

Attachment Table 1. (page 2 of 2).

Year	Alaska [a,b]			Canada [c]			Total		
	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total
1961	141,152	461,597	602,749	13,246	9,076	22,322	154,398	470,673	625,071
1962	105,844	434,663	540,507	13,937	9,436	23,373	119,781	444,099	563,880
1963	141,910	429,396	571,306	10,077	27,696	37,773	151,987	457,092	609,079
1964	109,818	504,420	614,238	7,408	12,187	19,595	117,226	516,607	633,833
1965	134,706	484,587	619,293	5,380	11,789	17,169	140,086	496,376	636,462
1966	104,887	309,502	414,389	4,452	13,192	17,644	109,339	322,694	432,033
1967	146,104	352,397	498,501	5,150	16,961	22,111	151,254	369,358	520,612
1968	118,632	270,818	389,450	5,042	11,633	16,675	123,674	282,451	406,125
1969	105,027	424,399	529,426	2,624	7,776	10,400	107,651	432,175	539,826
1970	93,019	585,760	678,779	4,663	3,711	8,374	97,682	589,471	687,153
1971	136,191	547,448	683,639	6,447	16,911	23,358	142,638	564,359	706,997
1972	113,098	461,617	574,715	5,729	7,532	13,261	118,827	469,149	587,976
1973	99,670	779,158	878,828	4,522	10,135	14,657	104,192	789,293	893,485
1974	118,053	1,229,678	1,347,731	5,631	11,646	17,277	123,684	1,241,324	1,365,008
1975	76,883	1,307,037	1,383,920	6,000	20,600	26,600	82,883	1,327,637	1,410,520
1976	105,582	1,026,908	1,132,490	5,025	5,200	10,225	110,607	1,032,108	1,142,715
1977	114,494	1,090,758	1,205,252	7,527	12,479	20,006	122,021	1,103,237	1,225,258
1978	129,988	1,615,312	1,745,300	5,881	9,566	15,447	135,869	1,624,878	1,760,747
1979	159,232	1,596,133	1,755,365	10,375	22,084	32,459	169,607	1,618,217	1,787,824
1980	197,665	1,730,960	1,928,625	22,846	23,718 [d]	46,564	220,511	1,754,678	1,975,189
1981	188,477	2,097,871	2,286,348	18,109	22,781 [d]	40,890	206,586	2,120,652	2,327,238
1982	152,808	1,265,457	1,418,265	17,208	16,091 [d]	33,299	170,016	1,281,548	1,451,564
1983	198,436	1,678,597	1,877,033	18,952	29,490 [d]	48,442	217,388	1,708,087	1,925,475
1984	162,683	1,548,101	1,710,784	16,795	29,767 [d]	46,562	179,478	1,577,868	1,757,346
1985	187,327	1,657,984	1,845,311	19,301	41,515 [d]	60,816	206,628	1,699,499	1,906,127
1986	146,004	1,758,825	1,904,829	20,364	14,843 [d]	35,207	166,368	1,773,668	1,940,036
1987	188,386	1,246,176	1,434,562	17,614	44,786 [d]	62,400	206,000	1,290,962	1,496,962
1988	148,421	2,311,214	2,459,635	21,427	33,915 [d]	55,342	169,848	2,345,129	2,514,977
1989	157,606	2,281,566	2,439,172	17,944	23,490 [d]	41,434	175,550	2,305,056	2,480,606
1990	149,433	1,053,351	1,202,784	19,227	34,302 [d]	53,529	168,660	1,087,653	1,256,313
1991	154,651	1,335,111	1,489,762	20,607	35,653 [d]	56,260	175,258	1,370,764	1,546,022
1992	168,191	863,575	1,031,766	17,903	21,310 [d]	39,213	186,094	884,885	1,070,979
1993	163,078	342,197	505,275	16,611	14,150 [d]	30,761	179,689	356,347	536,036
1994	172,315	577,233	749,548	21,218	38,340	59,558	193,533	615,573	809,106
1995	177,663	1,437,837	1,615,500	20,887	46,109	66,996	198,550	1,483,946	1,682,496
1996	138,562	1,121,181	1,259,743	19,612	24,395	44,007	158,174	1,145,576	1,303,750
1997	174,625	544,879	719,504	16,528	15,878	32,406	191,153	560,757	751,910
1998	99,369	199,735	299,104	5,937 [h]	8,115	14,052	105,306	207,850	313,156
1999	123,110	233,057	356,167	12,569	19,506	32,075	135,679	252,563	388,242
2000 [f]	9,115 [g]	7,272 [g]	16,387	4,649 [i]	3,795	8,444	13,764	11,067	24,831
Average									
1903-89	82,335	789,875	735,991	7,485	16,882	15,314	77,408	773,108	684,152
1990-99	152,100	770,816	922,915	17,110	25,776	42,886	169,210	796,591	965,801
1995-99	142,666	707,338	850,004	15,107	22,801	37,907	157,772	730,138	887,911

a Catch in number of salmon. Includes estimated number of salmon harvested for the commercial production of salmon roe.

b Commercial, subsistence, personal-use, and sport catches combined.

c Catch in number of salmon. Commercial, Aboriginal, domestic and sport catches combined.

d Includes the Old Crow Aboriginal fishery harvest of coho salmon.

f Data are preliminary.

g Subsistence, Personal use, Aboriginal and Sport Fish harvest data are unavailable at this time.

h Catch includes 737 chinook salmon taken in the test fishery.

i Catch includes 761 chinook salmon taken in the mark-recapture test fishery.

Attachment Table 2. Alaskan and Canadian total utilization of Yukon River chinook and fall chum salmon, 1961-2000.

	Chinook			Fall Chum		
Year	Canada [a]	Alaska [b, c]	Total	Canada [a]	Alaska [b, c]	Total
1961	13,246	141,152	154,398	9,076	144,233	153,309
1962	13,937	105,844	119,781	9,436	140,401	149,837
1963	10,077	141,910	151,987	27,696	99,031 [d]	126,727
1964	7,408	109,818	117,226	12,187	128,707	140,894
1965	5,380	134,706	140,086	11,789	135,600	147,389
1966	4,452	104,887	109,339	13,192	122,548	135,740
1967	5,150	146,104	151,254	16,961	107,018	123,979
1968	5,042	118,632	123,674	11,633	97,552	109,185
1969	2,624	105,027	107,651	7,776	183,373	191,149
1970	4,663	93,019	97,682	3,711	265,096	268,807
1971	6,447	136,191	142,638	16,911	246,756	263,667
1972	5,729	113,098	118,827	7,532	188,178	195,710
1973	4,522	99,670	104,192	10,135	285,760	295,895
1974	5,631	118,053	123,684	11,646	383,552	395,198
1975	6,000	76,883	82,883	20,600	361,600	382,200
1976	5,025	105,582	110,607	5,200	228,717	233,917
1977	7,527	114,494	122,021	12,479	340,757	353,236
1978	5,881	129,988	135,869	9,566	331,250	340,816
1979	10,375	159,232	169,607	22,084	593,293	615,377
1980	22,846	197,665	220,511	22,218	466,087	488,305
1981	18,109	188,477	206,586	22,281	654,976	677,257
1982	17,208	152,808	170,016	16,091	357,084	373,175
1983	18,952	198,436	217,388	29,490	495,526	525,016
1984	16,795	162,683	179,478	29,267	383,055	412,322
1985	19,301	187,327	206,628	41,265	474,216	515,481
1986	20,364	146,004	166,368	14,543	303,485	318,028
1987	17,614	188,386	206,000	44,480	361,663 [d]	406,143
1988	21,427	148,421	169,848	33,565	319,677	353,242
1989	17,944	157,606	175,550	23,020	518,157	541,177
1990	19,227	149,433	168,660	33,622	316,478	350,100
1991	20,607	154,651	175,258	35,418	403,678	439,096
1992	17,903	168,191	186,094	20,815	128,031 [g]	148,846
1993	16,611	163,078	179,689	14,090	76,925 [d]	91,015
1994	21,218	172,315	193,533	38,008	131,217	169,225
1995	20,887	177,663	198,550	45,600	415,547	461,147
1996	19,612	138,562	158,174	24,354	236,569	260,923
1997	16,528	174,625	191,153	15,580	154,479	170,059
1998	5,937 [i]	99,369	105,306	7,901	62,869	70,770
1999	12,569	123,110	135,679	19,506	110,369	129,875
2000 [f]	4,649 [j]	9,115	13,764 [f]	3,795 [h]	0 [h]	3,795
Average						
1961-89	11,023	137,314	148,337	17,787	300,598	318,385
1990-99	17,110	152,100	169,210	25,489	203,616	229,106
1995-99	15,107	142,666	157,772	22,588	195,967	218,555

[a] Catches in number of salmon. Includes commercial, Aboriginal, domestic, and sport catches combined.
[b] Catch in number of salmon. Includes estimated number of salmon harvested for the commercial productio of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).
[c] Commercial, subsistence, personal-use, and sport catches combined.
[d] Commercial fishery did not operate within the Alaskan portion of the drainage.
[f] Data are preliminary.
[g] Commercial fishery operated only in District 6, the Tanana River.
[h] Does not include Alaskan subsistence, personal use and sport fish harvests as these harvest numbers are unavailable at this time.
[i] Catch includes 737 chinook salmon taken in the test fishery.
[j] Catch includes 761 chinook salmon taken in the test fishery.

Attachment Table 3. Alaskan catch of Yukon River chinook salmon, 1961-2000

Year	Estimated Subsistence Use [a]	Harvest			
		Subsistence [b]	Commercial [c]	Sport [d]	Total
1961	21,488	21,488	119,664		141,152
1962	11,110	11,110	94,734		105,844
1963	24,862	24,862	117,048		141,910
1964	16,231	16,231	93,587		109,818
1965	16,608	16,608	118,098		134,706
1966	11,572	11,572	93,315		104,887
1967	16,448	16,448	129,656		146,104
1968	12,106	12,106	106,526		118,632
1969	14,000	14,000	91,027		105,027
1970	13,874	13,874	79,145		93,019
1971	25,684	25,684	110,507		136,191
1972	20,258	20,258	92,840		113,098
1973	24,317	24,317	75,353		99,670
1974	19,964	19,964	98,089		118,053
1975	13,045	13,045	63,838		76,883
1976	17,806	17,806	87,776		105,582
1977	17,581	17,581	96,757	156	114,494
1978	30,297	30,297	99,168	523	129,988
1979	31,005	31,005	127,673	554	159,232
1980	42,724	42,724	153,985	956	197,665
1981	29,690	29,690	158,018	769	188,477
1982	28,158	28,158	123,644	1,006	152,808
1983	49,478	49,478	147,910	1,048	198,436
1984	42,428	42,428	119,904	351	162,683
1985	39,771	39,771	146,188	1,368	187,327
1986	45,238	45,238	99,970	796	146,004
1987	53,124	53,124	134,760 [f]	502	188,386
1988	46,032	46,032	101,445	944	148,421
1989	51,062	51,062	105,491	1,053	157,606
1990	51,594	51,181	97,708	544	149,433
1991	48,311	46,773	107,105	773	154,651
1992	46,553	45,626	122,134	431	168,191
1993	66,261	65,701	95,682	1,695	163,078
1994	55,266	54,563	115,471	2,281	172,315
1995	50,258	48,934	126,204	2,525	177,663
1996	43,827	43,521	91,890	3,151	138,562
1997	57,060	56,291	116,421	1,913	174,625
1998	54,171	54,090	44,625	654	99,369
1999	52,699	52,525	69,562	1,023 [g]	123,110
2000 [g]	[h]	[h]	9,115	[h]	9,115
Average					
1961-89	27,102	27,102	109,866	771	137,314
1990-99	52,600	51,921	98,680	1,499	152,100
1995-99	51,603	51,072	89,740	1,853	142,666

a Includes salmon harvested for subsistence purposes, and an estimate of the number of salmon carcasses harvested for the commercial production of salmon roe and used for subsistence. These data are only available since 1990.

b Includes salmon harvested for subsistence and personal use.

c Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for the production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

d Sport fish harvest for the Alaskan portion of the Yukon River drainage. The majority of this harvest is believed to have been taken within the Tanana River drainage (see Schultz et al. 1993: 1992 Yukon Area AMR).

f Includes 653 and 2,136 chinook salmon illegally sold in District 5 and 6 (Tanana River), respectively.

g Data are preliminary.

h Data are unavailable at this time.

Attachment Table 4. Canadian catch of Yukon River chinook salmon, 1961-2000.

Year	Mainstem Yukon River Harvest							Porcupine River Aboriginal Fishery Harvest	Total Canadian Harvest
	Commercial	Domestic	Aboriginal Fishery	Sport [a]	Test Fishery	Combined Non-Commercial	Total		
1961	3,446		9,300			9,300	12,746	500	13,246
1962	4,037		9,300			9,300	13,337	600	13,937
1963	2,283		7,750			7,750	10,033	44	10,077
1964	3,208		4,124			4,124	7,332	76	7,408
1965	2,265		3,021			3,021	5,286	94	5,380
1966	1,942		2,445			2,445	4,387	65	4,452
1967	2,187		2,920			2,920	5,107	43	5,150
1968	2,212		2,800			2,800	5,012	30	5,042
1969	1,640		957			957	2,597	27	2,624
1970	2,611		2,044			2,044	4,655	8	4,663
1971	3,178		3,260			3,260	6,438	9	6,447
1972	1,769		3,960			3,960	5,729		5,729
1973	2,199		2,319			2,319	4,518	4	4,522
1974	1,808	406	3,342			3,748	5,556	75	5,631
1975	3,000	400	2,500			2,900	5,900	100	6,000
1976	3,500	500	1,000			1,500	5,000	25	5,025
1977	4,720	531	2,247			2,778	7,498	29	7,527
1978	2,975	421	2,485			2,906	5,881		5,881
1979	6,175	1,200	3,000			4,200	10,375		10,375
1980	9,500	3,500	7,546	300		11,346	20,846	2000	22,846
1981	8,593	237	8,879	300		9,416	18,009	100	18,109
1982	8,640	435	7,433	300		8,168	16,808	400	17,208
1983	13,027	400	5,025	300		5,725	18,752	200	18,952
1984	9,885	260	5,850	300		6,410	16,295	500	16,795
1985	12,573	478	5,800	300		6,578	19,151	150	19,301
1986	10,797	342	8,625	300		9,267	20,064	300	20,364
1987	10,864	330	6,069	300		6,699	17,563	51	17,614
1988	13,217	282	7,178	650		8,110	21,327	100	21,427
1989	9,789	400	6,930	300		7,630	17,419	525	17,944
1990	11,324	247	7,109	300		7,656	18,980	247	19,227
1991	10,906	227	9,011	300		9,538	20,444	163	20,607
1992	10,877	277	6,349	300		6,926	17,803	100	17,903
1993	10,350	243	5,576	300		6,119	16,469	142	16,611
1994	12,028	373	8,089	300		8,762	20,790	428	21,218
1995	11,146	300	7,945	700		8,945	20,091	796	20,887
1996	10,164	141	8,451	790		9,382	19,546	66	19,612
1997	5,311	288	8,888	1,230		10,406	15,717	811	16,528
1998	390	24	4,687	0	737	5,448	5,838	99	5,937
1999	3,160	213	8,804	278		9,295	12,455	114	12,569
2000 [b]	0	0	3,889	0	760	4,649	4,649	[c]	4,649
Average									
1961-89	5,588	633	4,762	335		5,227	10,815	233	11,023
1990-99	8,566	233	7,491	450		8,248	16,813	297	17,110
1995-99	6,034	193	7,755	600		8,695	14,729	377	15,107

[a] Sport fish harvest unknown prior to 1980.

[b] Data are preliminary.

[c] Data are unavailable at this time.

Attachment Table 5. Alaskan catch of Yukon River summer chum salmon, 1961-2000

Year	Estimated Subsistence Use [a]	Harvest			
		Subsistence [b]	Commercial [c]	Sport [d]	Total
1961	305,317 [f]	305,317 [f]	0		305,317
1962	261,856 [f]	261,856 [f]	0		261,856
1963	297,094 [f]	297,094 [f]	0		297,094
1964	361,080 [f]	361,080 [f]	0		361,080
1965	336,848 [f]	336,848 [f]	0		336,848
1966	154,508 [f]	154,508 [f]	0		154,508
1967	206,233 [f]	206,233 [f]	10,935		217,168
1968	133,880 [f]	133,880 [f]	14,470		148,350
1969	156,191 [f]	156,191 [f]	61,966		218,157
1970	166,504 [f]	166,504 [f]	137,006		303,510
1971	171,487 [f]	171,487 [f]	100,090		271,577
1972	108,006 [f]	108,006 [f]	135,668		243,674
1973	161,012 [f]	161,012 [f]	285,509		446,521
1974	227,811 [f]	227,811 [f]	589,892		817,703
1975	211,888 [f]	211,888 [f]	710,295		922,183
1976	186,872 [f]	186,872 [f]	600,894		787,766
1977	159,502	159,502	534,875	316	694,693
1978	197,144	171,383	1,077,987	451	1,249,821
1979	196,187	155,970	819,533	328	975,831
1980	272,398	167,705	1,067,715	483	1,235,903
1981	208,284	117,629	1,279,701	612	1,397,942
1982	260,969	117,413	717,013	780	835,206
1983	240,386	149,180	995,469	998	1,145,647
1984	230,747	166,630	866,040	585	1,033,255
1985	264,828	157,744	934,013	1,267	1,093,024
1986	290,825	182,337	1,188,850	895	1,372,082
1987	275,914	174,940	622,541	846	798,327
1988	311,742	198,824	1,620,269	1,037	1,820,130
1989	249,582	169,046	1,463,345	2,131	1,634,522
1990	201,839 [g]	117,436	525,440	472	643,348
1991	275,673 [g]	118,540	662,036	1,037	781,613
1992	261,448 [g]	125,497	545,544	1,308	672,349
1993	139,541 [g]	106,054	141,985	564	248,603
1994	245,973 [g]	132,494	261,953	350	394,797
1995	221,308 [g]	119,503	824,487	1,174	945,164
1996	248,856 [g]	103,408	689,542	1,854	794,804
1997	177,506	97,500	230,842	475	328,817
1998	86,275	86,088	31,817	421	118,326
1999	71,040	70,705	29,412	[j]	100,117
2000	[j]	[j]	7,272	[j]	7,272
Average					
1961-89	227,762	190,858	546,003	825	737,231
1990-99	192,946	107,723	394,306	851	502,794
1995-99	160,997	95,441	361,220	981	457,446

a Includes salmon harvested for subsistence purposes, and an estimate of the number of salmon carcasses harveste for the commercial production of salmon roe and used for subsistence. These data are only available since 1990.

b Includes salmon harvested for subsistence and personal use.

c Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for the production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

d Includes both summer and fall chum salmon sport fish harvest within the Alaskan portion of the Yukon River drainage. The majority of this harvest is believed to have been taken within the Tanana River drainage.

f Catches estimated because catches of species other than chinook salmon were not differentiated.

g Subsistence harvest, summer chum salmon commercially harvested for the production of salmon roe in District 5 and 6, and the estimated subsistence use of commercially-harvested summer chum salmon in District 4.

h Data are preliminary.

j Data are unavailable at this time.

Attachment Table 6. Alaskan catch of Yukon River fall chum salmon, 1961-2000.

Year	Estimated Subsistence Use [a]	Harvest		
		Subsistence [b]	Commercial [c]	Total [d]
1961	101,772 [f, g]	101,772 [f]	42,461	144,233
1962	87,285 [f, g]	87,285 [f]	53,116	140,401
1963	99,031 [f, g]	99,031 [f]	0	99,031
1964	120,360 [f, g]	120,360 [f]	8,347	128,707
1965	112,283 [f, g]	112,283 [f]	23,317	135,600
1966	51,503 [f, g]	51,503 [f]	71,045	122,548
1967	68,744 [f, g]	68,744 [f]	38,274	107,018
1968	44,627 [f, g]	44,627 [f]	52,925	97,552
1969	52,063 [f, g]	52,063 [f]	131,310	183,373
1970	55,501 [f, g]	55,501 [f]	209,595	265,096
1971	57,162 [f, g]	57,162 [f]	189,594	246,756
1972	36,002 [f, g]	36,002 [f]	152,176	188,178
1973	53,670 [f, g]	53,670 [f]	232,090	285,760
1974	93,776 [f, g]	93,776 [f]	289,776	383,552
1975	86,591 [f, g]	86,591 [f]	275,009	361,600
1976	72,327 [f, g]	72,327 [f]	156,390	228,717
1977	82,771 [g]	82,771 [g]	257,986	340,757
1978	94,867 [g]	84,239 [g]	247,011	331,250
1979	233,347	214,881	378,412	593,293
1980	172,657	167,637	298,450	466,087
1981	188,525	177,240	477,736	654,976
1982	132,897	132,092	224,992	357,084
1983	192,928	187,864	307,662	495,526
1984	174,823	172,495	210,560	383,055
1985	206,472	203,947	270,269	474,216
1986	164,043	163,466	140,019	303,485
1987	361,663	361,663 [h]	0	361,663
1988	158,694	155,467	164,210	319,677
1989	230,978	216,229	301,928	518,157
1990	185,244	173,076	143,402	316,478
1991	168,890	145,524	258,154	403,678
1992	110,903	107,602	20,429 [k]	128,031
1993	76,925	76,925	0	76,925
1994	127,586	123,218	7,999	131,217
1995	163,693	131,369	284,178	415,547
1996	146,154	129,222	107,347	236,569
1997	96,899	95,425	59,054	154,479
1998	62,869	62,869	0	62,869
1999	89,999	89,998	20,371	110,369
2000	[m]	[m]	0	0
Average				
1961-89	123,702	121,127	179,471	300,598
1990-99	122,916	113,523	90,093	203,616
1995-99	111,923	101,777	94,190	195,967

[a] Includes salmon harvested for subsistence purposes, and an estimate of the number of salmon carcas harvested for the commercial production of salmon roe and used for subsistence. These data are only available since 1990.

[b] Includes salmon harvested for subsistence and personal use.

[c] Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area A

[d] Does not include sport-fish harvest. The majority of the sport-fish harvest is believed to be taken in t Tanana River drainage. Sport fish division does not differentiate between the two races of chum salm However, the majority of this harvest is believed to be summer chum salmon.

[f] Catches estimated because catches of species other than chinook salmon were not differentiated.

[g] Minimum estimates because surveys were conducted prior to the end of the fishing season.

[h] Includes an estimated 95,768 and 119,168 fall chum salmon illegally sold in Districts 5 and 6 (Tanana River), respectively.

[j] Data are preliminary.

[k] Commercial fishery operated only in District 6, the Tanana River.

[m] Data are unavailable at this time.

Attachment Table 7. Canadian catch of Yukon River fall chum salmon, 1961-2000.

Year	Mainstem Yukon River Harvest					Porcupine River Aboriginal Fishery Harvest	Total Canadian Harvest
	Commercial	Domestic	Aboriginal Fishery	Combined Non-Commercial	Total		
1961	3,276		3,800	3,800	7,076	2,000	9,076
1962	936		6,500	6,500	7,436	2,000	9,436
1963	2,196		5,500	5,500	7,696	20,000	27,696
1964	1,929		4,200	4,200	6,129	6,058	12,187
1965	2,071		2,183	2,183	4,254	7,535	11,789
1966	3,157		1,430	1,430	4,587	8,605	13,192
1967	3,343		1,850	1,850	5,193	11,768	16,961
1968	453		1,180	1,180	1,633	10,000	11,633
1969	2,279		2,120	2,120	4,399	3,377	7,776
1970	2,479		612	612	3,091	620	3,711
1971	1,761		150	150	1,911	15,000	16,911
1972	2,532			0	2,532	5,000	7,532
1973	2,806		1,129	1,129	3,935	6,200	10,135
1974	2,544	466	1,636	2,102	4,646	7,000	11,646
1975	2,500	4,600	2,500	7,100	9,600	11,000	20,600
1976	1,000	1,000	100	1,100	2,100	3,100	5,200
1977	3,990	1,499	1,430	2,929	6,919	5,560	12,479
1978	3,356	728	482	1,210	4,566	5,000	9,566
1979	9,084	2,000	11,000	13,000	22,084		22,084
1980	9,000	4,000	3,218	7,218	16,218	6,000	22,218
1981	15,260	1,611	2,410	4,021	19,281	3,000	22,281
1982	11,312	683	3,096	3,779	15,091	1,000	16,091
1983	25,990	300	1,200	1,500	27,490	2,000	29,490
1984	22,932	535	1,800	2,335	25,267	4,000	29,267
1985	35,746	279	1,740	2,019	37,765	3,500	41,265
1986	11,464	222	2,200	2,422	13,886	657	14,543
1987	40,591	132	3,622	3,754	44,345	135	44,480
1988	30,263	349	1,882	2,231	32,494	1,071	33,565
1989	17,549	100	2,462	2,562	20,111	2,909	23,020
1990	27,537	0	3,675	3,675	31,212	2,410	33,622
1991	31,404	0	2,438	2,438	33,842	1,576	35,418
1992	18,576	0	304	304	18,880	1,935	20,815
1993	7,762	0	4,660	4,660	12,422	1,668	14,090
1994	30,035	0	5,319	5,319	35,354	2,654	38,008
1995	39,012	0	1,099	1,099	40,111	5,489	45,600
1996	20,069	0	1,260	1,260	21,329	3,025	24,354
1997	8,068	0	1,218	1,218	9,286	6,294	15,580
1998	0	0	1,742	1,742	1,742	6,159	7,901
1999	10,402	0	3,104	3,104	13,506	6,000	19,506
2000	1,319	0	2,476	2,476	3,795	[a]	3,795
Average							
1961-89	9,372	1,157	2,551	3,101	12,474	5,503	17,787
1990-99	19,287	0	2,482	2,482	21,768	3,721	25,489
1995-99	15,510	0	1,685	1,685	17,195	5,393	22,588

[a] Data are unavailable at this time.

Attachment Table 8. Alaskan catch of Yukon River coho salmon, 1961-2000.

Year	Estimated Subsistence Use [a]	Harvest			
		Subsistence [b]	Commercial [c]	Sport [d]	Total
1961	9,192 [f,g]	9,192 [f,g]	2,855		12,047
1962	9,480 [f,g]	9,480 [f,g]	22,926		32,406
1963	27,699 [f,g]	27,699 [f,g]	5,572		33,271
1964	12,187 [f,g]	12,187 [f,g]	2,446		14,633
1965	11,789 [f,g]	11,789 [f,g]	350		12,139
1966	13,192 [f,g]	13,192 [f,g]	19,254		32,446
1967	17,164 [f,g]	17,164 [f,g]	11,047		28,211
1968	11,613 [f,g]	11,613 [f,g]	13,303		24,916
1969	7,776 [f,g]	7,776 [f,g]	15,093		22,869
1970	3,966 [f,g]	3,966 [f,g]	13,188		17,154
1971	16,912 [f,g]	16,912 [f,g]	12,203		29,115
1972	7,532 [f,g]	7,532 [f,g]	22,233		29,765
1973	10,236 [f,g]	10,236 [f,g]	36,641		46,877
1974	11,646 [f,g]	11,646 [f,g]	16,777		28,423
1975	20,708 [f,g]	20,708 [f,g]	2,546		23,254
1976	5,241 [f,g]	5,241 [f,g]	5,184		10,425
1977	16,333 [g]	16,333 [g]	38,863	112	55,308
1978	7,787 [g]	7,787 [g]	26,152	302	34,241
1979	9,794	9,794	17,165	50	27,009
1980	20,158	20,158	8,745	67	28,970
1981	21,228	21,228	23,680	45	44,953
1982	35,894	35,894	37,176	97	73,167
1983	23,905	23,905	13,320	199	37,424
1984	49,020	49,020	81,940	831	131,791
1985	32,264	32,264	57,672	808	90,744
1986	34,468	34,468	47,255	1,535	83,258
1987	84,894	84,894	0 [h]	1,292	86,186
1988	69,080	69,080	99,907	2,420	171,407
1989	41,583	41,583	85,493	1,811	128,887
1990	47,896	44,641	46,937	1,947	93,525
1991	40,894	37,388	109,657	2,775	149,820
1992	53,344	51,921	9,608 [k]	1,666	63,195
1993	15,772	15,772	0	897	16,669
1994	48,926	44,594	4,451	2,174	51,219
1995	29,716	28,642	47,206	1,278	77,126
1996	33,651	30,510	57,710	1,588	89,808
1997	24,295	24,295	35,818	1,470	61,583
1998	17,781	17,781	1	758	18,540
1999	20,970	20,970	1,601	[m]	22,571
2000 [m]			0		0
Average					
1961-89	22,163	22,163	25,482	736	47,976
1990-99	33,325	31,651	31,299	1,617	64,406
1995-99	25,283	24,440	28,467	1,274	53,926

a Includes salmon harvested for subsistence purposes, and an estimate of the number of salmon carcasses harvested for the commercial production of salmon roe and used for subsistence. These data are only available since 1990.

b Includes salmon harvested for subsistence and personal use.

c Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for the production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

d Sport fish harvest for the Alaskan portion of the Yukon River drainage. The majority of this harvest is believed to have been taken within the Tanana River drainage (see Schultz et al. 1993: 1992 Yukon Area AMR).

f Catches estimated because catches of species other than chinook were not differentiated.

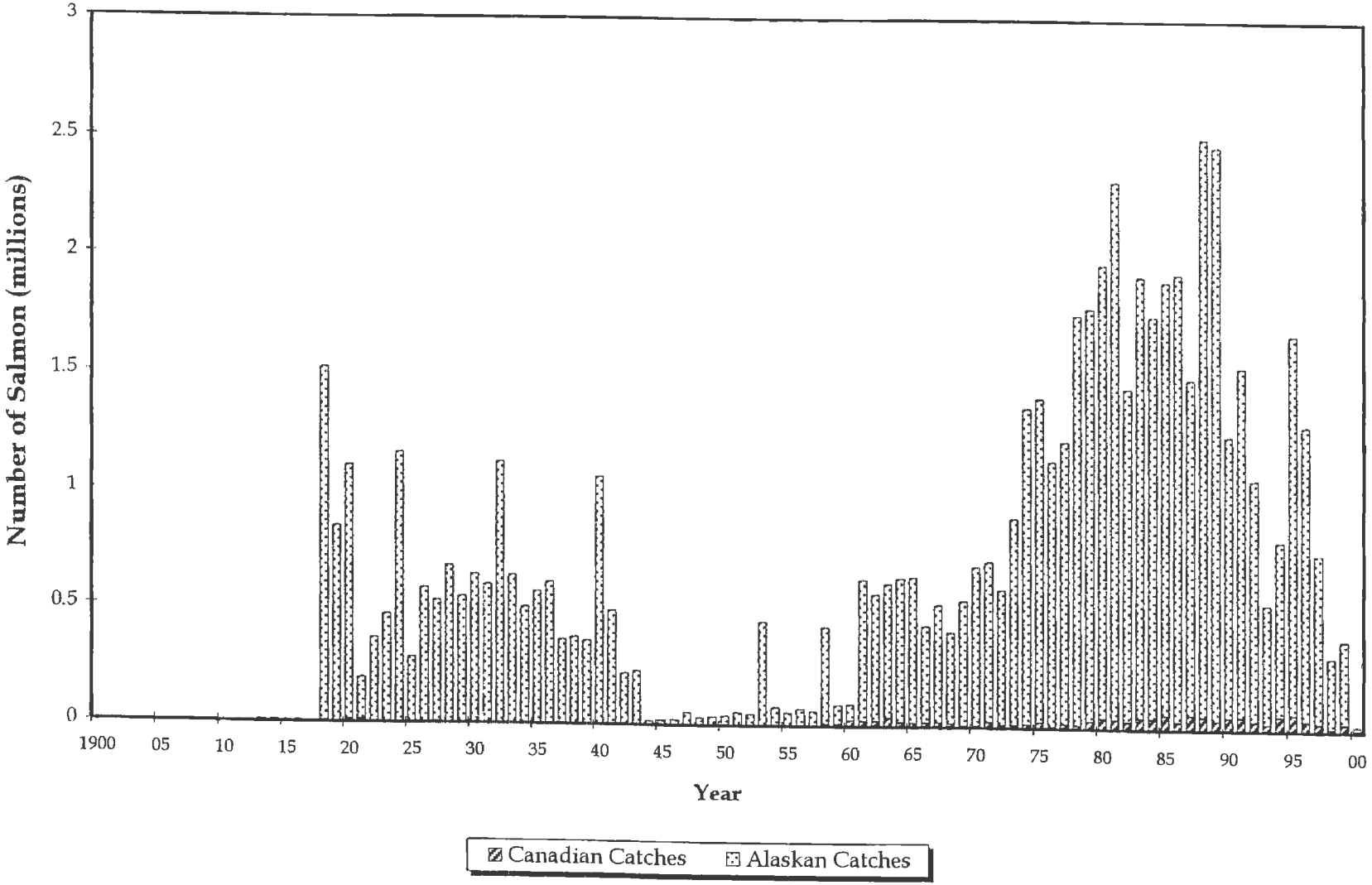
g Minimum estimates because surveys were conducted prior to the end of the fishing season.

h Includes an estimated 5,015 and 31,276 coho salmon illegally sold in Districts 5 and 6 (Tanana River), respectively.

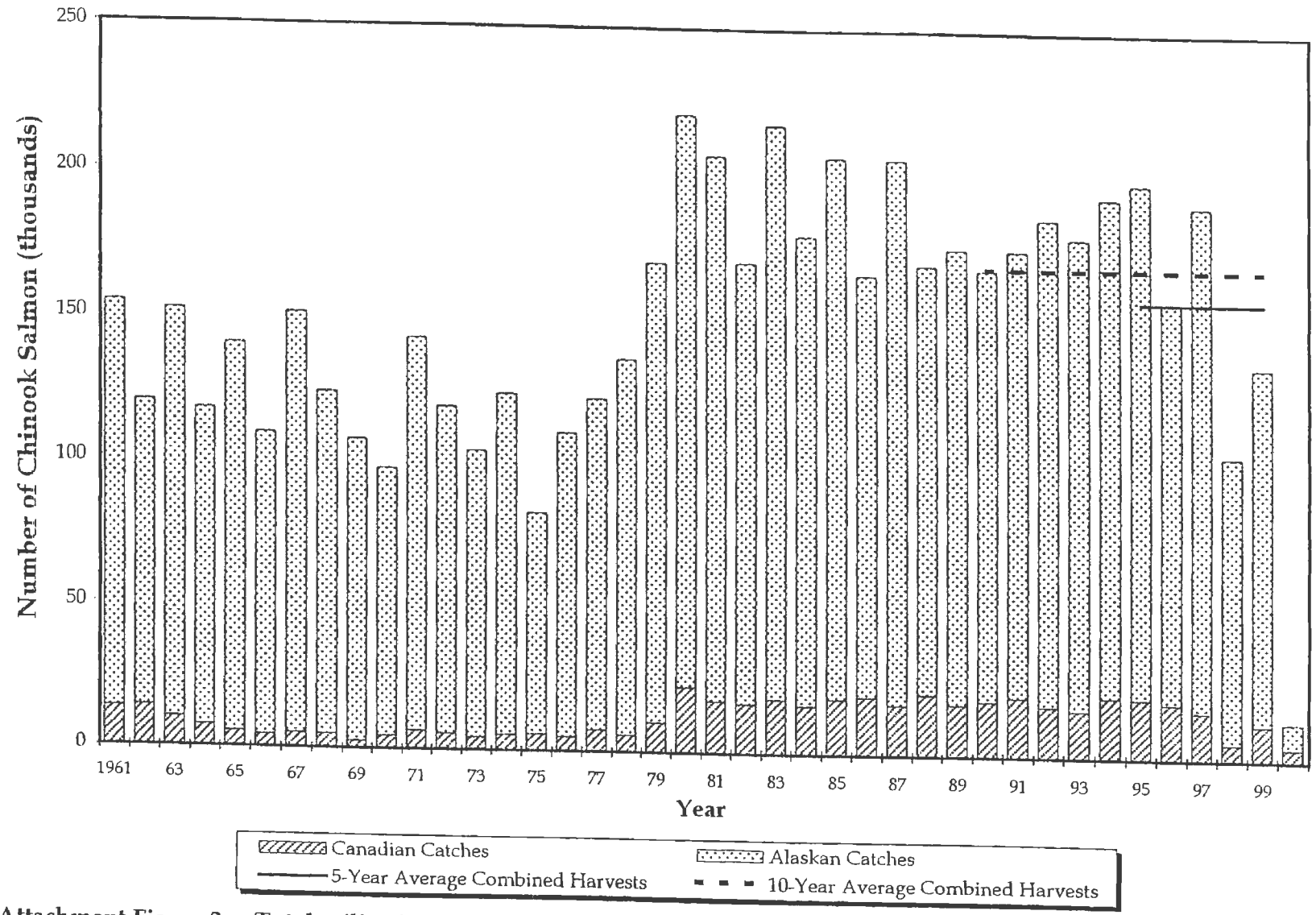
j Data are preliminary.

k Commercial fishery operated only in District 6, the Tanana River.

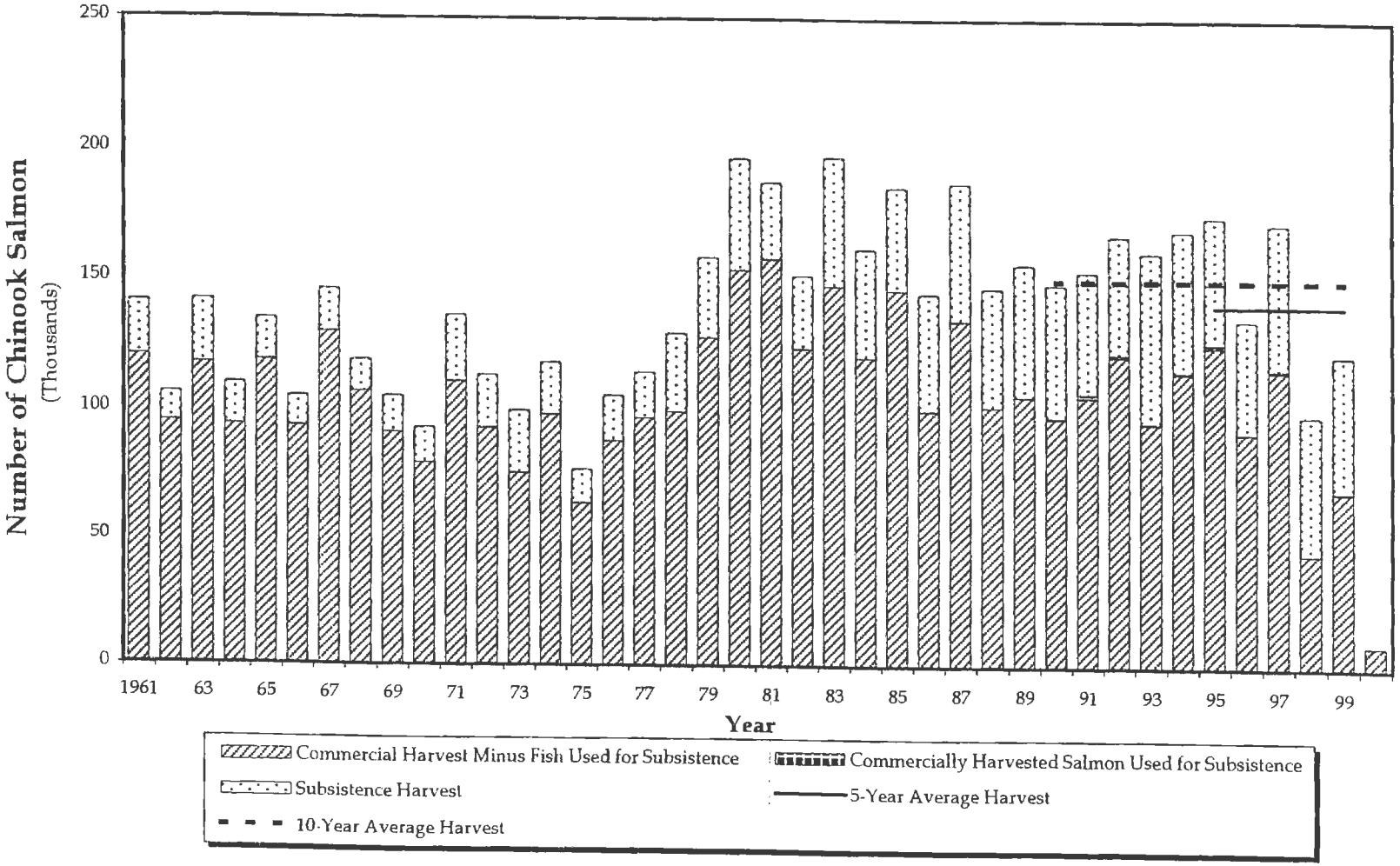
m Data are unavailable at this time.



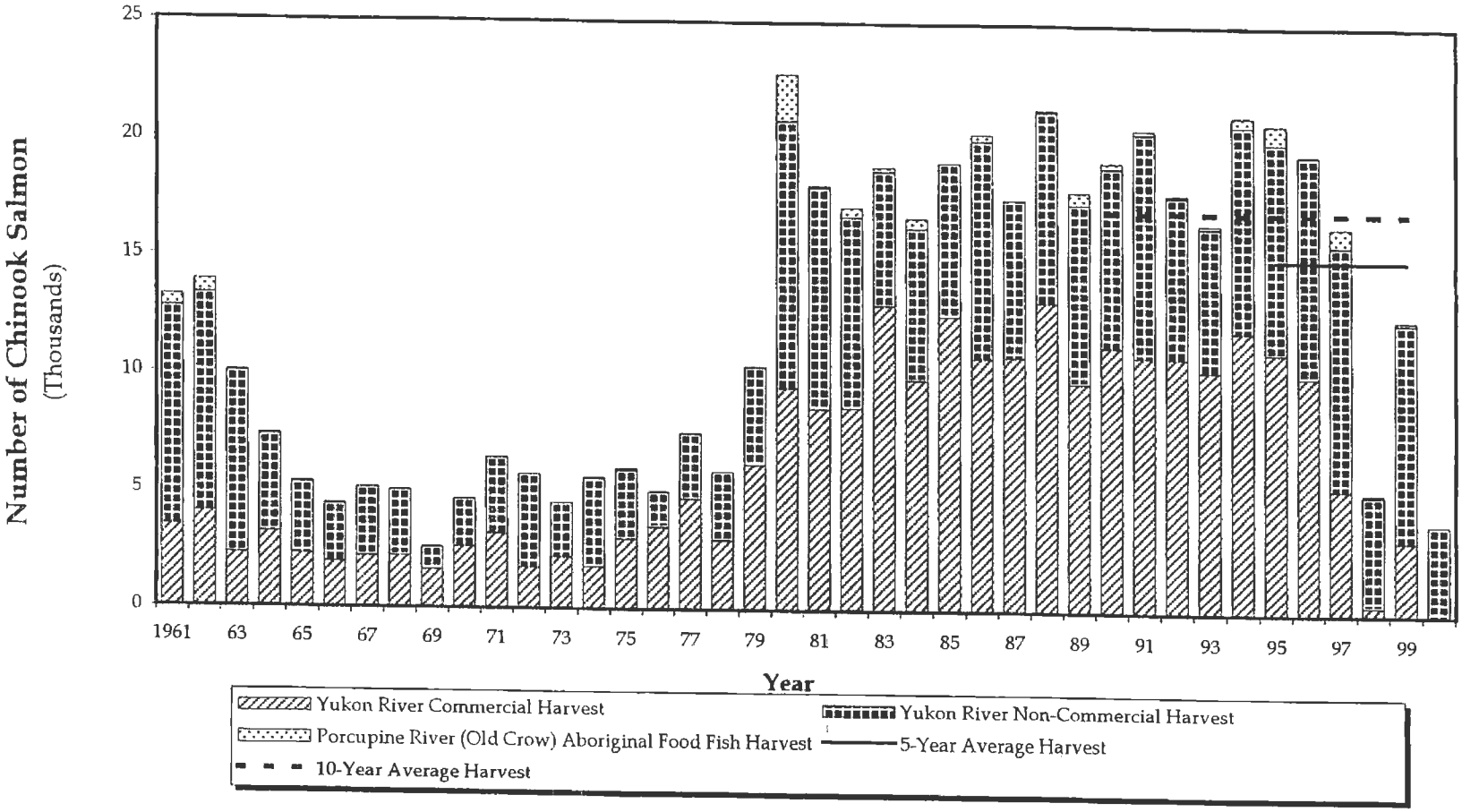
Attachment Figure 1. **Total utilization of chinook, chum and coho salmon, Yukon River, 1900-2000. The 2000 Alaskan harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.**



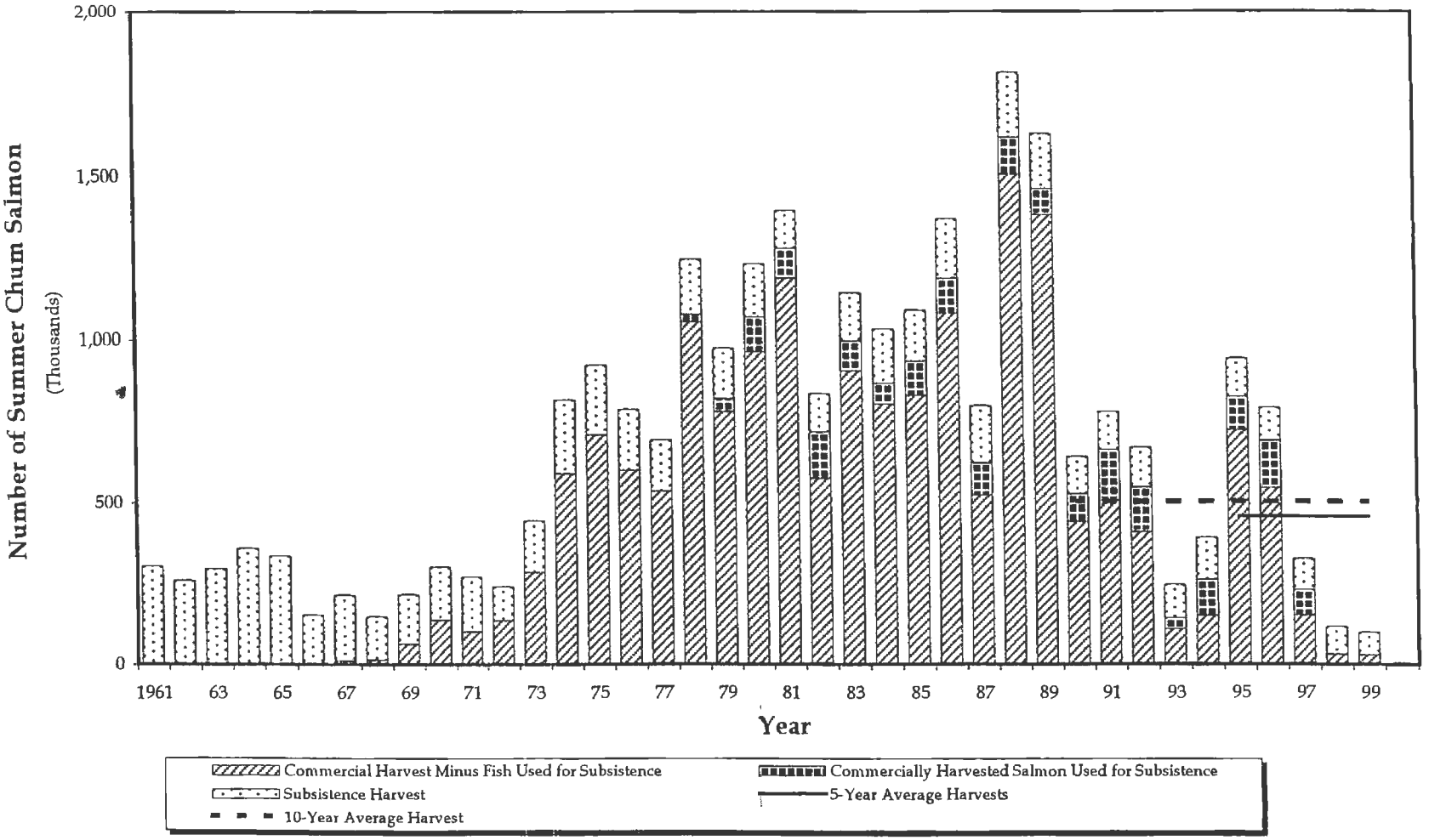
Attachment Figure 2. **Total utilization of chinook salmon, Yukon River, 1961-2000. The 2000 Alaskan harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.**



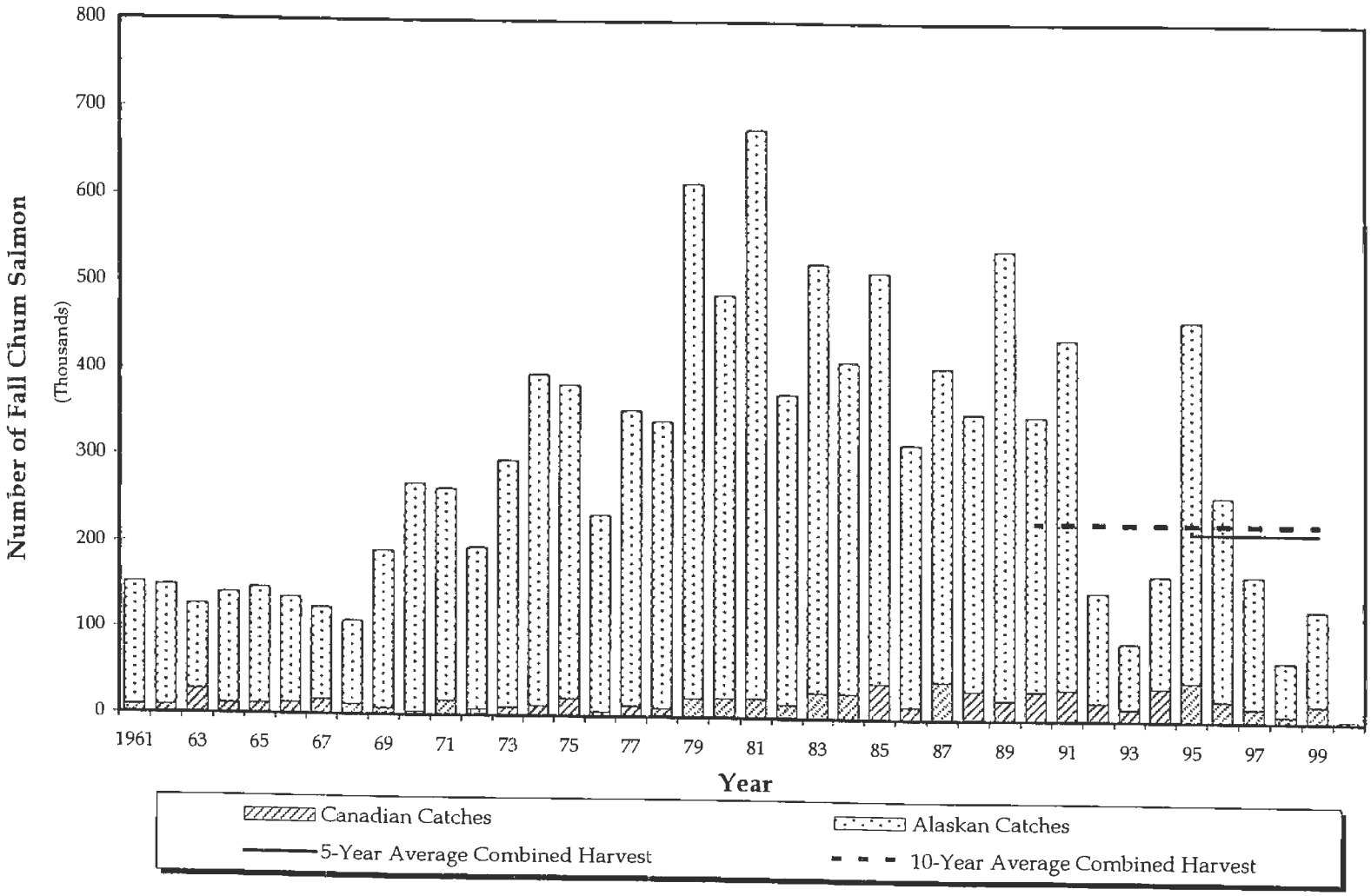
Attachment Figure 3. Alaskan harvest of chinook salmon, Yukon River, 1961-2000. The 2000 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.



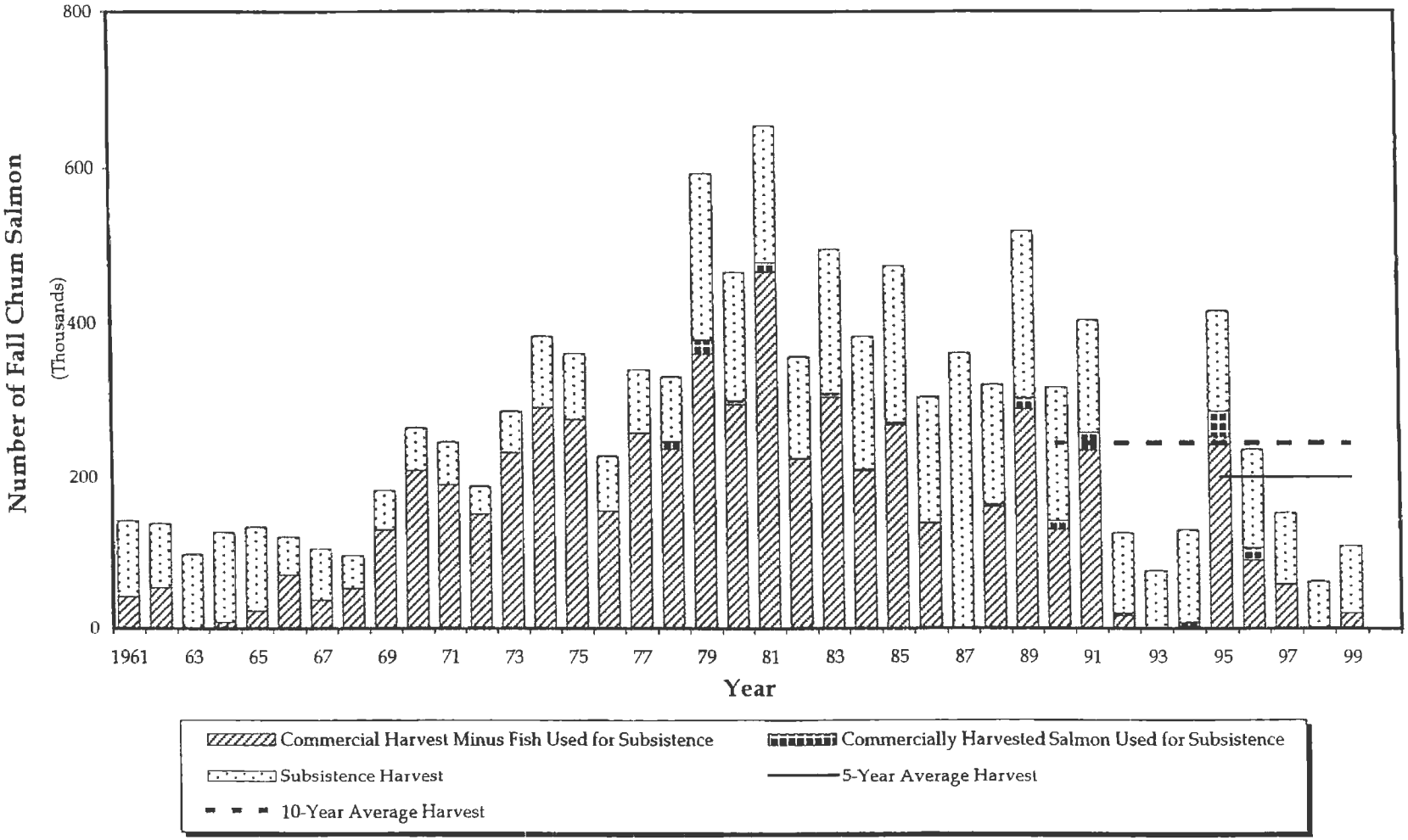
Attachment Figure 4. **Canadian harvest of chinook salmon, Yukon River, 1961-2000. Reported harvests for 2000 should be considered minimum as some harvest estimates are unavailable at this time.**



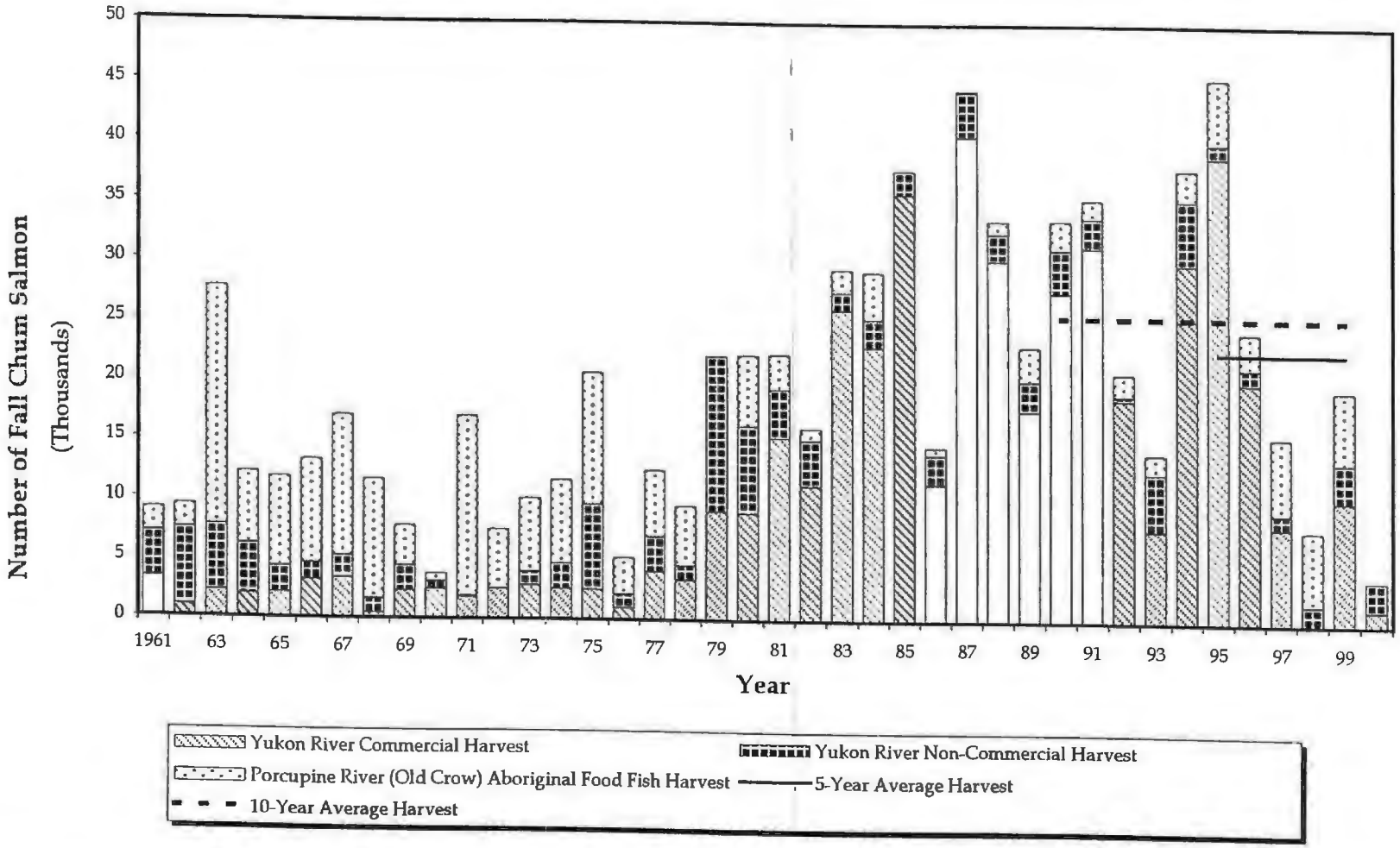
Attachment Figure 5. Alaskan harvest of summer chum salmon, Yukon River, 1961-2000. The 2000 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.



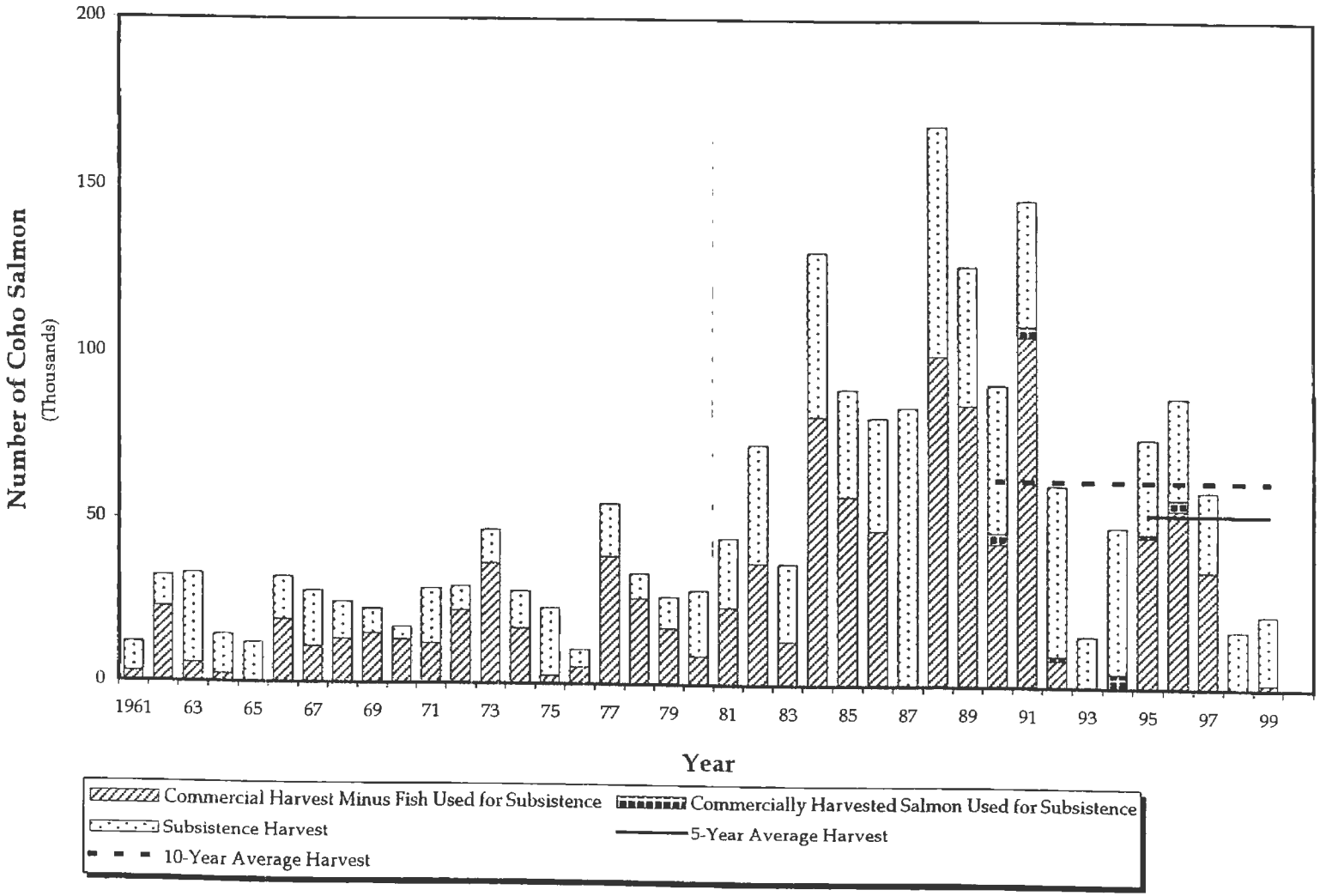
Attachment Figure 6. **Total utilization of fall chum salmon, Yukon River, 1961-2000. The 2000 Alaskan harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.**



Attachment Figure 7. Alaskan harvest of fall chum salmon, Yukon River, 1961-2000. The 2000 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.



Attachment Figure 8. **Canadian harvest of fall chum salmon, Yukon River, 1961-1999. Canadian harvest data for 2000 is unavailable at this time.**



Attachment Figure 9. **Alaskan harvest of coho salmon, Yukon River, 1961-2000. The 2000 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.**

Attachment Table 9. Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1961-2000.[a]

Year	Andreafsky River			Anvik River		Nulato River			Gisasa River		Chena River			Salcha River		
	East Fork		West Fork	River	Index Area	North Fork	South Fork	Mainstem	River		River		Index Area	River		Index Area
	Aerial	Tower or Weir	Aerial	Aerial [b]	Aerial [b]	Aerial [c]	Aerial	Tower	Aerial	Weir	Population Estimate [m]	Aerial	Aerial [d]	Population Estimate [m]	Aerial	Aerial [f]
1961	1,003			1,226		376 [g]	167		266 [g]							
1962	675 [g]		762 [g]												2,878	
1963												61 [g, h]			937	
1964	867		705									137 [g, h]				
1965			344 [g]	650 [g]											450	
1966	361		303	638											408	
1967			276 [g]	336 [g]											800	
1968	380		383	310 [g]												
1969	274 [g]		231 [g]	296 [g]											739	
1970	665		574 [g]	368											461 [g]	
1971	1,904		1,682									6 [g]			1,882	
1972	798		582 [g]	1,198								193 [g, h]			158 [g]	
1973	825		788	613								138 [g, h]			1,193	1,034
1974			285	471 [g]		55 [g]	23 [g]		161			21 [g]			391	352 [j]
1975	993		301	730		123	81		385			1,016 [h]	959 [h]		1,857	1,620
1976	818		643	1,053		471	177		332			316 [h]	262 [h]		1,055	950 [j]
1977	2,008		1,499	1,371		286	201		255			531	496		1,641	1,473
1978	2,487		1,062	1,324		498	422		45 [g]			563			1,202	1,052
1979	1,180		1,134	1,484		1,093	414		484			1,726			3,499	3,258
1980	958 [g]		1,500	1,330	1,192	954 [g]	369 [g]		951			1,159 [g]			4,789	4,310 [j]
1981	2,146 [g]		231 [g]	807 [g]	577 [g]		791					2,541			6,757	6,126
1982	1,274		851						421			600 [g]			1,237	1,121
1983				653 [g]	376 [g]	526	480		572			2,073			2,534	2,346
1984	1,573 [g]		1,993	641 [g]	574 [g]							2,553	2,336		1,961	1,803
1985	1,617		2,248	1,051	720	1,600	1,180		735			501	494		1,031	906
1986	1,954	1,530 [k]	3,158	1,118	918	1,452	1,522		1,346			2,553	2,262		2,035	1,860
1987	1,608	2,011 [k]	3,281	1,174	879	1,145	493		731		9,065	2,031	1,935		3,368	3,031 [j]
1988	1,020	1,339 [k]	1,448	1,805	1,449	1,061	714		797		6,404	1,312	1,209	4,771	1,898	1,671
1989	1,399		1,089	442 [g]	212 [g]						3,346	1,966	1,760	4,562	2,761	2,553
1990	2,503		1,545	2,347	1,595	568 [g]	430 [g, n]		884 [g]		2,666	1,280	1,185	3,294	2,333	2,136
1991	1,938		2,544	875 [g]	625 [g]	767	1,253		1,690		5,603	1,436	1,402	10,728	3,744	3,429
1992	1,030 [g]		2,002 [g]	1,536	931	348	231		910		3,025	1,277 [g]	1,277 [g]	5,608	2,212 [g]	1,925 [g]
1993	5,855		2,765	1,720	1,526	1,844	1,181		1,573		5,230	825 [g]	799 [g]	7,862	1,484 [g]	1,436 [g]
1994	300	7,801 [p, e]	213 [g]		913 [g]	843	952	1,795 [r]	2,775	2,888 [s]	12,241 [k]	2,943	2,660	10,007 [k]	3,636	3,562
1995	1,635	5,841 [p]	1,108	1,996	1,147	968	681	1,412	410	4,023	11,877 [k]	1,570	1,570	18,399 [k]	11,823	11,189
1996		2,955 [p]	624	839	709		100 [n]	756		1,952	9,680	3,575	3,039	13,643 [k]	3,978	3,734
1997	1,140	3,186 [p]	1,510	3,979	2,690			4,766	144	3,764	6,833	2,233	2,112	7,958	4,866	4,800
1998	1,027	4,011 [p]	1,249 [g]	709 [g]	648 [g]	507	546	1,536	889	2,356 [v]	13,390 [k]	3,495	3,303	18,396 [k]	3,457 [g]	3,457 [g]
1999		3,347 [p]			950 [g]			1,932		2,631 [v]	4,745 [k]	440 [g]	386 [g]	5,027 [k]	2,055 [g]	1,923 [g]
2000 [t]	1,018	1,358 [p]	427	1,721	1,394			908		2,089	6,485 [k]		2,412	9,198 [k]		3,608
E.O. [t]	>1,500		>1,400	>1,300 [u]	>500 [u]	>800	>500		>600		4,707 [m]	962 [g]	934 [g]	3,108 [k]	2,562 [g]	2,478 [g]
													>1,700			>2,500

continued

[a] Aerial survey counts are peak counts only Survey rating was fair or good unless otherwise noted.
[b] From 1961-1970, river count data are from aerial surveys of various segments of the mainstem Anvik River. From 1972-1979, counting tower operated; mainstem aerial survey counts below the tower were added to tower counts. From 1980-present, aerial survey counts for the river are best available minimal estimates for the entire Anvik River drainage. Index area counts are from the mainstem Anvik River between the Yellow River and McDonald Creek.
[c] Includes mainstem counts below the confluence of the North and South Forks, unless otherwise noted.
[d] Chena River index area for assessing the escapement objective is from Moose Creek Dam to Middle Fork River.
[f] Salcha River index area for assessing the escapement objective is from the TAPS crossing to Caribou Creek.
[g] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts
[h] Boat survey.
[j] Data unavailable for index area. Calculated from historic (1972-91) average ration of index area counts to total river counts (0.90:1.0).
[k] Tower counts.
[m] Mark-recapture population estimate.
[n] Mainstem counts below the confluence of the North and South Forks Nulato River included in the South Fork counts.
[p] Weir counts.
[r] Incomplete count because of late installation and/or early removal of project.
[s] Data are preliminary.
[t] Interim escapement goals. Established March, 1992.
[u] Interim escapement goal for the entire Anvik River drainage is 1,300 salmon. Interim escapement objective for mainstem Anvik River between the Yellow River and McDonald Creek is 500 salmon.
[v] Estimate is expanded for missing data caused by high water. Actual count in published agency reports may vary.

Attachment Table 10. Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1991-2000.

Year	Tincup Creek [a]	Tatchun Creek [b]	Little Salmon River [a]	Big Salmon River [a, c]	Nisutlin River [a, d]	Ross River [a, f]	Wolf River [a, g]	Whitehorse Fishway		Canadian Mainstem		
								Count	Percent Hatchery Contribution	Border Passage Estimate	Harvest	Spawning Escapement Estimate [j]
1961								1,068	0			
1962								1,500	0			
1963								483	0			
1964								595	0			
1965								903	0			
1966		7 [k]						563	0			
1967								533	0			
1968			173 [k]	857 [k]	407 [k]	104 [k]		414	0			
1969			120	286	105			334	0			
1970		100		670	615		71 [k]	625	0			
1971		130	275	275	650		750	856	0			
1972		80	126	415	237		13	391	0			
1973		99	27 [k]	75 [k]	36 [k]			224	0			
1974		192		70 [k]	48 [k]			273	0			
1975		175		153 [k]	249		40 [k]	313	0			
1976		52		86 [k]	102			121	0			
1977		150	408	316 [k]	77			277	0			
1978		200	330	524	375			725	0			
1979		150	489 [k]	632	713		183 [k]	1,184	0			
1980		222	286 [k]	1,436	975		377	1,383	0			
1981		133	670	2,411	1,626	949	395	1,555	0			
1982		73	403	758	578	155	104	473	0	36,598	16,808	19,790
1983	100	264	101 [k]	540	701	43 [k, n]	95	905	0	47,741	18,752	28,989
1984	150	153	434	1,044	832	151 [k]	124	1,042	0	43,911	16,295	27,616
1985	210	190	255	801	409	23 [k]	110	508	0	29,881	19,151	10,730
1986	228	155	54 [k]	745	459 [k]	72 [p]	109	557	0	36,479	20,064	16,415
1987	100	159	468	891	183	180 [k]	35	327	0	30,823	17,563	13,260
1988	204	152	368	765	267	242	66	405	16	44,445	21,327	23,118
1989	88	100	862	1,662	695	433 [p]	146	549	19	42,620	17,419	25,201
1990	83	643	665	1,806	652	457 [k]	188	1,407	24	56,679	18,980	37,699 [q]
1991			326	1,040		250	201 [r]	1,266 [h]	51 [h]	41,187	20,444	20,743 [q]
1992	73	106	494	617	241	423	110 [r]	758 [h]	84 [h]	43,185	17,803	25,382 [q]
1993		183	184	572	339	400	168 [r]	668 [h]	73 [h]	45,027	16,469	28,558 [q]
1994	101 [k]	477	726	1,764	389	506	393 [r]	1,577 [h]	54 [h]	46,680	20,790	25,890 [q]
1995	121	397	781	1,314	274	253 [k]	229 [r]	2,103	57	52,353	20,091	32,262 [q]
1996	150	423	1,150	2,565	719	102 [k]	705 [r]	2,958	35	47,955	19,546	28,409 [q]
1997	193	1,198	1,025	1,345	277		322 [r]	2,084	24	53,400	15,717	37,683 [q]
1998	53	405	361	523	145		66	777	95	22,588	5,838	16,750 [q]
1999		250	495	353	330		131	1,118	90	23,608	12,455	11,153 [q]
2000 [s]	19 [t]	241 [u]	46	113	20		32	677	59	17,215	4,649	12,566 [q]
E.O.												28,000 [q]

continued

[a] Data obtained by aerial survey unless otherwise noted. Only peak counts are listed. Survey rating is fair to good, unless otherwise noted.
[b] All foot surveys prior to 1997 except 1978 (boat survey) and 1986 (aerial survey).
[c] For 1968, 1970, and 1971 counts are from mainstem Big Salmon River. For all other years counts are from the mainstem Big Salmon River between Big Salmon Lake and the vicinity of South Creek.
[d] One Hundred Mile Creek to Sidney Creek.
[f] Big Timber Creek to Lewis Lake.
[g] Wolf Lake to Red River.
[h] Counts and estimated percentages may be slightly exaggerated. In some or all of these years a number of adipose-clipped fish ascended the fishway, and were counted more than once. These fish would have been released into the fishway as fry between 1989 and 1994, inclusive.
[j] Estimated total spawning escapement excluding Porcupine River (estimated border escapement minus the Canandian catch).
[k] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.
estimated spawning escapement from the DFO tagging study for years 1983, and 1985-1989.
[n] Information on area surveyed is unavailable.
[p] Counts are for Big Timber Creek to Sheldon Lake.
[q] Interim escapement objective. Stabilization escapement objective for years 1990-1995 was 18,000 salmon. Rebuilding step escapement objective for years 1996-2001 is 28,000 salmon.
[r] Counts are for Wolf Lake to Fish Lake outlet.
[s] Data are preliminary.
[t] Foot survey.
[u] Project installation was delayed due to high water, therefore, counts are incomplete.

Attachment Table 11. Summer chum salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1973-2000. [a]

Year	Andreafsky River			Anvik River		Rodo River	Kaltag Creek	Nulato River			Gisasa River		Hogatza River		Tozitna River	Chena River		Salcha River	
	East Fork		West Fork					South Fork	North Fork [c]	Mainstem			Clear & Caribou Cr.	Clear Creek					
	Aerial	Sonar, Tower, or Weir Counts	Aerial	Tower & Aerial [b]	Sonar	Aerial	Tower	Aerial	Aerial	Tower	Aerial	Weir	Aerial	Tower	Aerial	Aerial	Tower	Aerial	Tower
1973	10,149 [d]		51,835	249,015															
1974	3,215 [d]		33,578	411,133		16,137		29,016	29,334		22,022					79 [d]		290	
1975	223,485		235,954	900,967		25,335		51,215	87,280		56,904		22,355,		1,823	4,349		3,510	
1976	105,347		118,420	511,475		38,258		9,230 [d]	30,771		21,342		20,744		3,512	1,670		7,573	
1977	112,722		63,120	358,771		16,118		11,385	58,275		2,204 [d]		10,734		725 [d]	685		6,484	
1978	127,050		57,321	307,270		17,845		12,821	41,659		9,280 [d]		5,102		761 [d]	610		677 [d]	
1979	66,471		43,391		280,537			1,506	35,598		10,962		14,221		2,262	1,609		5,405	
1980	36,823 [d]		114,759		492,676			3,702 [d]	11,244 [d]		10,388		19,786			1,025 [d]		3,060	
1981	81,555	147,312 [f]			1,486,182			14,348							580	338		4,140	
1982	7,501 [d]	181,352 [f]	7,267 [d]		444,581						334 [d]		4,984 [d]			3,500		8,500	
1983		110,608 [f]			362,912			1,263 [d]	19,749		2,356 [d]		28,141		874	1,509		3,756	
1984	95,200 [d]	70,125 [f]	238,565		891,028								184 [d]		1,604	1,097		716 [d]	
1985	66,146		52,750		1,080,243	24,576		10,494	19,344		13,232		22,566			1,861		9,810	
1986	83,931	167,614 [g]	99,373		1,189,602			16,848	47,417		12,114				1,030	1,005		3,178	
1987	6,687 [d]	45,221 [g]	35,535		455,876			4,094	7,163		2,123		5,669 [d]		1,778	1,509		8,028	
1988	43,056	68,937 [g]	45,432		1,125,449	13,872		15,132	26,951		9,284		6,890			333		3,657	
1989	21,460 [d]				636,906										2,983	432		2,889 [d]	
1990	11,519 [d]		20,426 [d]		403,627	1,941 [d]		3,196 [d, h]	1,419 [d]		450 [d]					714 [d]		1,574 [d]	
1991	31,886		46,657		847,772	3,977		13,150	12,491		7,003		2,177 [d]		36	245 [d]		450 [d]	
1992	11,308 [d]		37,808 [d]		775,626	4,465		5,322	12,358		9,300		9,947		93	115 [d]		154 [d]	
1993	10,935 [d]		9,111 [d]		517,409	7,867		5,486	7,698		1,581		2,986		794	848 [d]		3,222	
1994		200,981 [j, k]			1,124,689		47,295			148,762 [k]	6,827	51,116 [k]	8,247 [m]		970	168	5,400	212	5,809
1995		172,148 [j]			1,339,418	12,849	77,193	10,875	29,949	236,890 [g]	6,458	136,886		116,735	4,985	1,137	9,984	4,916	39,450
1996		108,450 [j]			933,240	4,380	51,269	8,490 [d, h]		129,694 [g]		157,589	27,090 [m]	100,912	2,310	185 [d]	3,519 [k]	934 [d]	30,784
1997		51,139 [j]			609,118	2,775 [d]	48,018			157,975 [g]	686 [d]	31,800	1,821 [d]	76,454	428 [d]	2,061	12,810 [k]	9,722	74,827 [k]
1998		67,591 [j]			471,865		8,113			49,140 [g]		18,228 [n]	120 [d, r]	212 [k]	7 [d]	594 [d]	9,439 [k]	3,968 [d]	35,741 [k]
1999		32,229 [j]			437,631		5,300			30,076 [g]		9,920 [n]		11,300		24 [d]	5,901 [k]	370 [d]	17,289 [k]
2000 [q]	2,094 [d]	23,349 [j]	18,989 [d]		205,460		6,727			24,308 [g]		14,410 [n]		18,698	480	107 [d]	9,165 [k] 3,515	228 [d]	23,221 [g] 20,516 [g]
E.O. [p]	>109,000		>116,000		>500,000				>53,000 [o]				>17,000 [p]					>3,500	

continued

[a] Aerial survey counts are peak counts only, survey rating is fair or good unless otherwise noted.
[b] From 1972-1979 counting tower operated; escapement estimate listed is the tower counts plus expanded aerial survey counts below the tower (see Buklis 1982).
[c] Includes mainstem counts below the confluence of the North and South Forks, unless otherwise noted.
[d] Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count.
[e] Sonar count.
[f] Tower count.
[g] Mainstem counts below the confluence of the North and South Fords of the Nulato River included in the South Fork counts.
[h] Weir count.
[i] Incomplete count due to late installation and/or early removal of project or high water events.
[j] BLM helicopter survey.
[k] Interim escapement goals. Established March, 1992.
[l] Interim escapement objective for North Fork Nulato River only.
[m] Consists of Clear and Caribou Creeks interim escapement objectives of 9,000 and 8,000, respectively.
[n] Data are preliminary.
[o] Consists of Clear Creek only.
[p] Estimate is expanded for missing data caused by high water. Actual count in published agency reports may vary.

Attachment Table 12. Fall chum salmon escapement counts for selected spawning areas in Alaskan and Canadian portions of the Yukon River Drainage, 1971-2000.[a]

	Alaska				Canada								
										Canadian Mainstem			
Year	Toklat River [b]	Delta River [c]	Chandalar River [d]	Sheenjek River [d]	Fishing Branch River [f, g]	Mainstem Yukon River Index [g, h]	Koidern River [g]	Kluane River [g, j]	Teslin River [g, k]	Border Passage Estimate	Harvest	Spawning Escapement Estimate [m]
1971					312,800							
1972		5,384			35,125 [n]			198 [p, r]				
1973		10,469			15,989 [s]	383		2,500				
1974	41,798	5,915		89,966 [t]	32,525 [s]			400				
1975	92,265	3,734 [v]		173,371 [t]	353,282 [s]	7,671		362 [r]				
1976	52,891	6,312 [v]		26,354 [t]	36,584			20				
1977	34,887	16,876 [v]		45,544 [t]	88,400			3,555				
1978	37,001	11,136		32,449 [t]	40,800			0 [r]				
1979	158,336	8,355		91,372 [t]	119,898			4,640 [r]				
1980 [ah]	26,346	5,137		28,933 [t]	55,268			3,150		39,130	16,218	22,912
1981	15,623	23,508		74,560	57,386 [w]			25,806		66,347	19,281	47,066
1982	3,624	4,235		31,421	15,901	1,020 [x]		5,378		47,049	15,091	31,958
1983	21,869	7,705		49,392	27,200	7,560		8,578 [r]		118,365	27,490	90,875
1984	16,758	12,411		27,130	15,150	2,800 [y]	1,300	7,200	200	81,900	25,267	56,633 [z]
1985	22,750	17,276 [v]		152,768	56,016 [s]	10,760	1,195	7,538	356	99,775	37,765	62,010 [z]
1986	17,976	6,703 [v]	59,313	84,207 [aa]	31,723 [s]	825	14	16,686	213	101,826	13,886	87,940 [z]
1987	22,117	21,180	52,416	153,267 [aa]	48,956 [s]	6,115	50	12,000		125,121	44,345	80,776 [z]
1988	13,436	18,024	33,619	45,206 [aa]	23,597 [s]	1,550	0	6,950	140	69,280	32,494	36,786 [z]
1989	30,421	21,342 [v]	69,161	99,116 [aa]	43,834 [s]	5,320	40	3,050	210 [p]	55,861	20,111	35,750 [z]
1990	34,739	8,992 [v]	78,631	77,750 [aa]	35,000 [ab]	3,651	1	4,683	739	82,947	31,212	51,735 [z]
1991	13,347	32,905 [v]		86,496 [ac]	37,733 [s]	2,426	53	11,675	468	112,303	33,842	78,461 [z]
1992	14,070	8,893 [v]		78,808 [ac]	22,517 [s]	4,438	4	3,339	450	67,962	18,880	49,082 [z]
1993	27,838	19,857		42,922 [ac]	28,707 [s]	2,620	0	4,610	555	42,165	12,422	29,743 [z]
1994	76,057	23,777 [v]		150,565 [ac]	65,247 [s]	1,429 [p]	20 [p]	10,734	209 [p]	133,712	35,354	98,358 [z]
1995	54,513 [ah]	20,587	280,999	241,855 [ac]	51,971 [s, aj]	4,701	0	16,456	633	198,203	40,111	158,092 [z]
1996	18,264	19,758	208,170	246,889 [ac]	77,278 [s]	4,977		14,431	315	143,758	21,329	122,429 [z]
1997	14,511	8,000	199,874	80,423	26,959 [s]	2,189		3,350	207	94,725	9,286	85,439 [z]
1998	15,605	7,804	75,811	33,058	13,564 [s]	7,292		7,337	235	48,047	1,742	46,305 [z]
1999	4,551	16,534	88,662	13,959	12,094			5,136	19 [p]	75,541	13,506	62,035 [z]
2000	5,095 [ad]	2,095 [ad]	70,000 [ad]	30,022 [p]	5,053 [ad]	933 [p]		1,442	204	59,598	3,795	55,803 [z]
E.O. [af]	>33,000	>11,000		>64,000 [ag]	50,000-120,000							>80,000

continued

[a] Latest table revision January 5, 2001.

[b] Expanded total abundance estimates for upper Toklat River index area using stream life curve (SLC) developed with 1987-1993 data. Index area includes Geiger Creek, Sushana River, and mainstem floodplain sloughs from approximately 0.25 mile upstream of roadhouse to approximately 1.25 miles downstream of roadhouse.

[c] Estimates are a total spawner abundance, generally from using spawner abudance curves and streamlife data.

[d] Side-scan sonar estimate for Sheenjek beginning in 1981 and for Chandalar in 1986-1990. Split beam sonar estimate for Chandalar beginning in 1995.

[f] Located within the Canadian portion of the Porcupine River drainage. Total escapement estimated using weir to aerial survey expansion factor of 2.72, unless otherwise indicated.

[g] Aerial survey count unless otherwise indicated.

[h] Tatchun Creek to Fort Selkirk.

[j] Duke River to end of spawning sloughs below Swede Johnston Creek.

[k] Boswell Creek area (5 km below to 5 km above confluence).

[m] Excludes Fishing Branch River escapement (estimated border passage minus Canadian removal).

[n] Weir installed on September 22. Estimate consists of a weir count of 17,190 after September 22, and a tagging passage estimate of 17,935 prior to weir installation.

[p] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.

[r] Foot survey.

[s] Weir count.

[t] Total escapement estimate using sonar to aerial survey expansion factor of 2.22.

[v] Population estimate from replicate foot surveys and stream life data.

[w] Initial aerial survey count was doubled before applying the weir/aerial expansion factor of 2.72 since only half of the spawning area was surveyed.

[x] Boat survey.

[y] Total index area not surveyed. Survey included the mainstem Yukon River between Yukon Crossing to 30 km below Fort Selkirk.

[z] Escapement estimate based on mark-recapture program unavailable. Estimate based on assumed average exploitation rate.

[aa] Expanded estimates for period approximateing second week August through middle fourth week September, using Chandalar River run timing data.

[ab] Weir was not operated. Although only 7,541 chum salmon were counted on a single survey flown October 26, a population estimate of approximately 27,000 fish was made through date of survey, based upon historic average aerial-to-weir expansion of 28%. Actual population of spawners was reported by DFO as between 30,000-40,000 fish considering aerial survey timing.

[ac] Total abundance estimates are for the period approximating second week August through middle fourth week of September. Comparative escapement estimates prior to 1986 are considered more conservative; approximating the period of end of August through middle week of September.

[ad] Data are preliminary.

[af] Interim escapement objective.

[ag] Based on escapement estimates for years 1974-1990.

[ah] Minimal estimate because of late timing of ground surveys with respect to peak of spawning.

[aj] Incomplete count due to late installation and/or early removal of project or high water events.

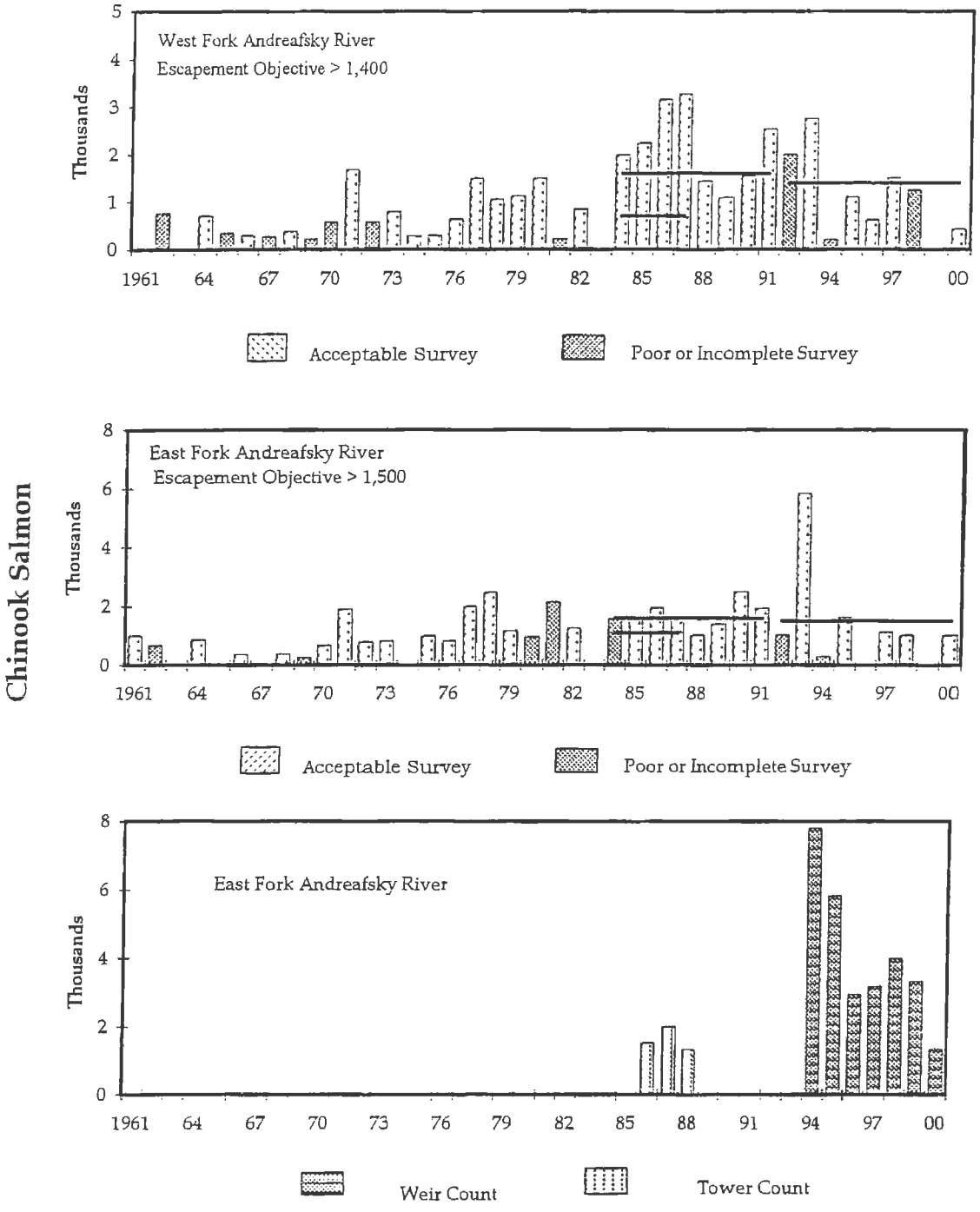
[ak] Data unavailable at this time.

Attachment Table 13. Coho salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1972-2000. [a]

Year	Andreafsky River		Anvik River	Kantishna River		Nenana River				Delta Clearwater River [f, g]	Clearwater Lake and Outlet	Richardson Clearwater River
	East Fork	West Fork		Geiger Creek [b]	Barton Creek	Lost Slough	Nenana Mainstem [c]	Wood Creek [d]	Seventeen Mile Slough			
1972										630	417	454 [k]
1973										3,322	551 [f]	375 [f]
1974						1,388			27	3,954 [j]	560	652 [f]
1975						943			956	5,100	1,575 [f, h]	4 [k]
1976			467 [k]	25 [j]		118			281	1,920	1,500 [f, h]	80 [k]
1977			81 [k]	60		524 [k]		310 [m]	1,167	4,793	730 [f, h]	327
1978						350		300 [m]	466	4,798	570 [f, h]	
1979						227			1,987	8,970	1,015 [f, h]	372
1980				3 [j]		499 [k]		1,603 [m]	592	3,946	1,545 [f, h]	611
1981	1,657 [k]					274		849 [n, r]	1,005	8,563 [p]	459 [k]	550
1982				81				1,436 [n, r]		8,365 [p]		
1983				42		766		1,042 [n]	103	8,019 [p]	253	88
1984				20 [j]		2,677		8,826 [n]		11,061	1,368	428
1985				42 [j]		1,584		4,470 [n]	2,081	5,358	750	
1986				5	496	794		1,664 [n]	218 [d, h]	10,857	3,577	146 [k]
1987				1,175		2,511		2,387 [n]	3,802	22,300	4,225 [f, h]	
1988	1,913	830	1,203	159	437	348		2,046 [n]		21,600	825 [f, h]	
1989				155	12 [k]			412 [n]	824 [k]	11,000	1,600 [f, h]	483
1990				211		688	1,308		15 [k]	8,325	2,375 [f, h]	
1991				427	467 [k]	564	447		52	23,900	3,150 [f, h]	
1992				77	55 [k]	372			490	3,963	229 [f, h]	500 [f]
1993				138	141	484	419	666 [n, s]	581	10,875	3,525 [f, h]	
1994				410	2,000 [n, s]	944	1,648	1,317 [n, s]	2,909	62,675 [w]	3,425 [f, h]	5,800 [f]
1995	10,901 [n]			142	192 [n, s, aa]	4,169	2,218	500 [n]	2,972 [k]	20,100	3,625 [f, h]	
1996	8,037 [n]			233	0 [n]	2,040	2,171	2,416 [j]	3,668 [d, h]	14,075 [x]	1,125 [f, y]	
1997	9,462 [n]			274		1,524 [ab]	1,446	1,464 [j, ac]	1,996 [d, h]	11,525 [z]	2,775 [f, h]	
1998	5,417 [n]			157		1,360	2,771		1,413	11,100	2,775 [f, h]	
1999	2,963 [n]			29		1,002	745		662	10,975		
2000 [l]	8,199 [n]					55 [k]	66 [k]	385	879	9,225	1,025	2,175
E.O.										>9,000 [u]		

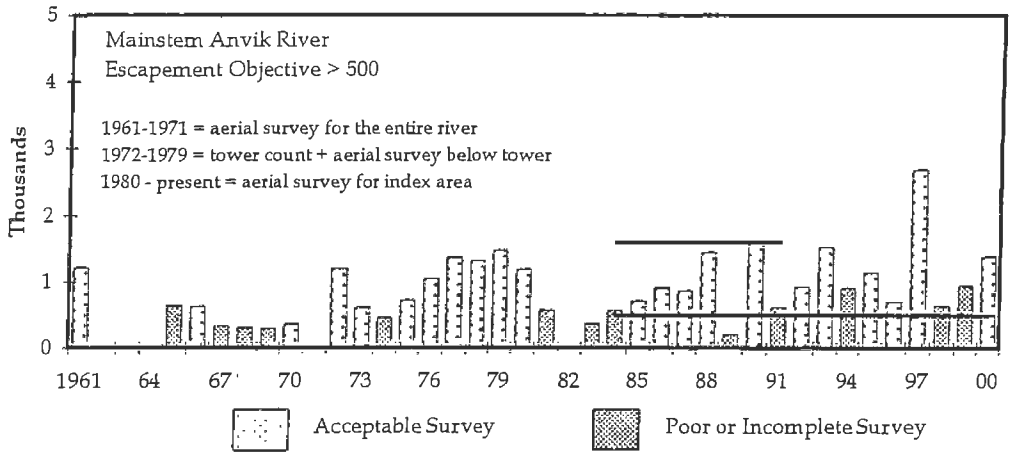
continued

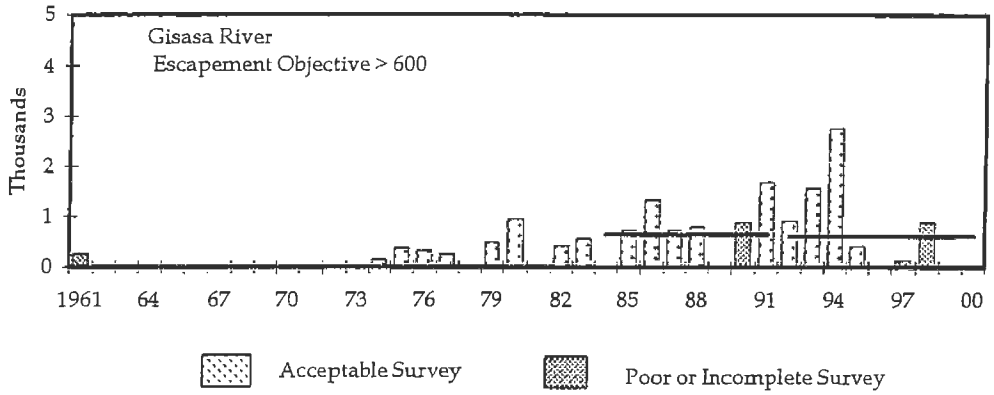
[a] Aerial surveys unless otherwise noted. Only peak counts presented. Survey rating is fair to good, unless otherwise noted.
[b] Foot survey, unless otherwise indicated.
[c] Mainstem Nenana River between confluences of Lost Slough and Teklanika River.
[d] Surveyed by F.R.E.D.
[f] Surveyed by Sport Fish division.
[g] Boat survey counts in the lower 17.5 river miles, unless otherwise indicated.
[h] Boat survey.
[j] Aerial survey.
[k] Poor survey.
[m] Foot survey.
[n] Weir count.
[p] Expanded estimate based on partial survey counts and historic distribution of spawners from 1977-1980.
[r] Coho weir was operated at the mough of Clear Creek (Shores Landing).
[s] Incomplete count because of late installation and/or early removal of project.
[t] Data are preliminary.
[u] Interim escapement objective established March, 1993, based on boat survey counts of coho salmon in the lower 17.5 river miles during the period October 21-27.
[w] An additional 17,565 coho salmon were counted by helicopter in the Delta Clearwater outside of the normal mainstem index area.
[x] An additional 3,300 coho salmon were counted by helicopter in the Delta Clearwater outside of the normal mainstem index area.
[y] An additional 350 coho salmon were counted in Clearwater Lake Inlet.
[z] An additional 2,375 coho salmon were counted by helicopter in the Delta Clearwater outside of the normal mainstem index area.
[aa] An additional 1,000 coho salmon were estimated pooled downstream of weir on October 2, just prior to weir removal.
[ab] Survey of western floodplain sloughs only.
[ac] Beginning at confluence of Clear Creek, the survey includes counts of Glacier and Wood Creeks up to their headwaters.

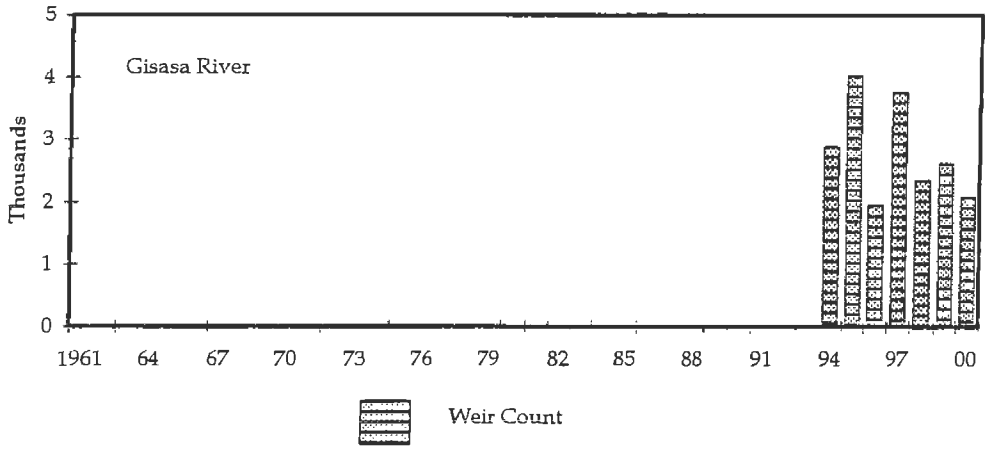


Attachment Figure 10. Chinook salmon escapement data for selected spawning areas in the Alaskan 'portion of the Yukon River drainage, 1961-2000. Data are aerial survey observations unless noted otherwise. Horizontal lines represent interim escapement goal objectives or ranges. Note that the scale of the vertical axis differs between projects.

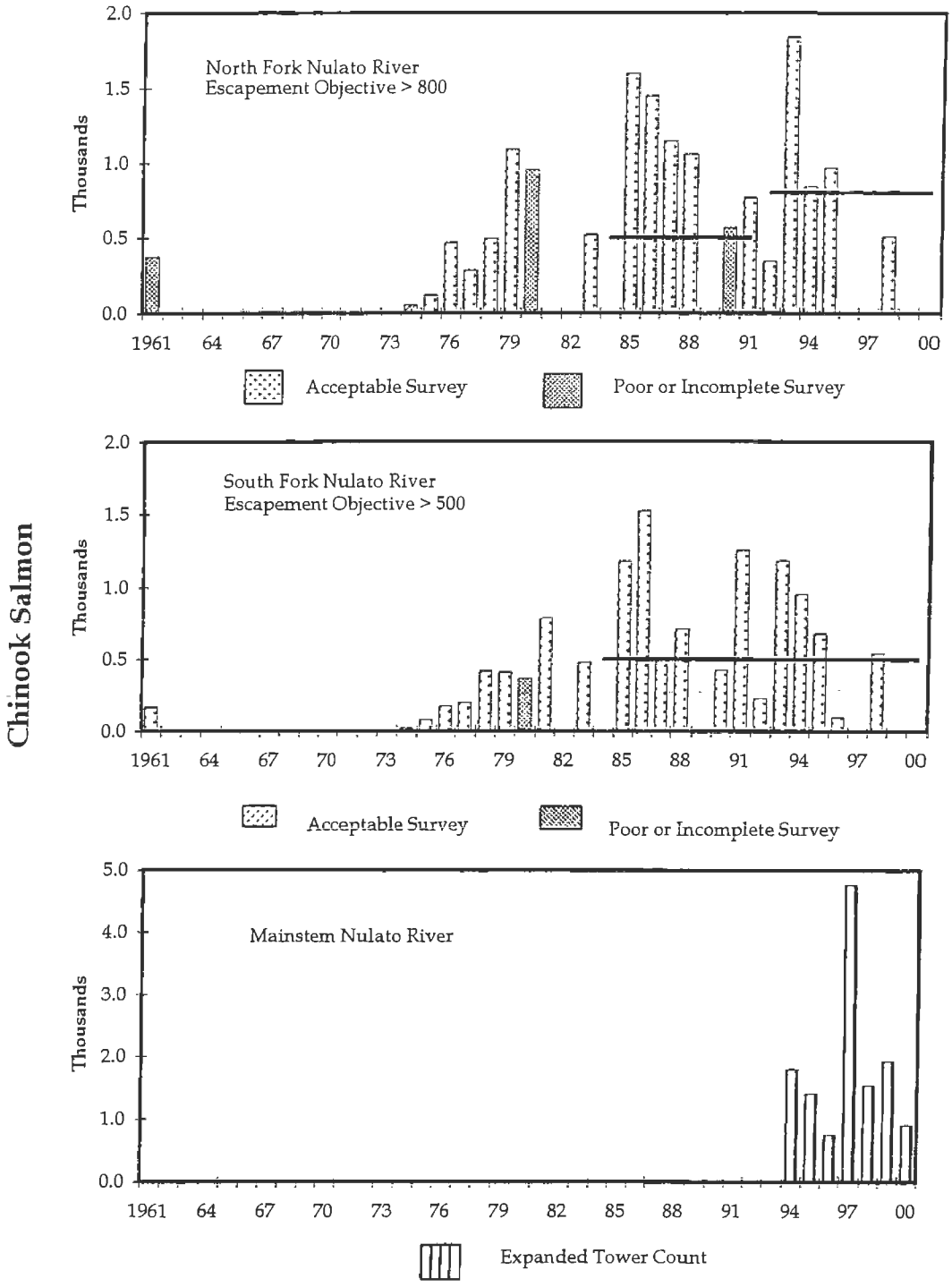
Chinook Salmon



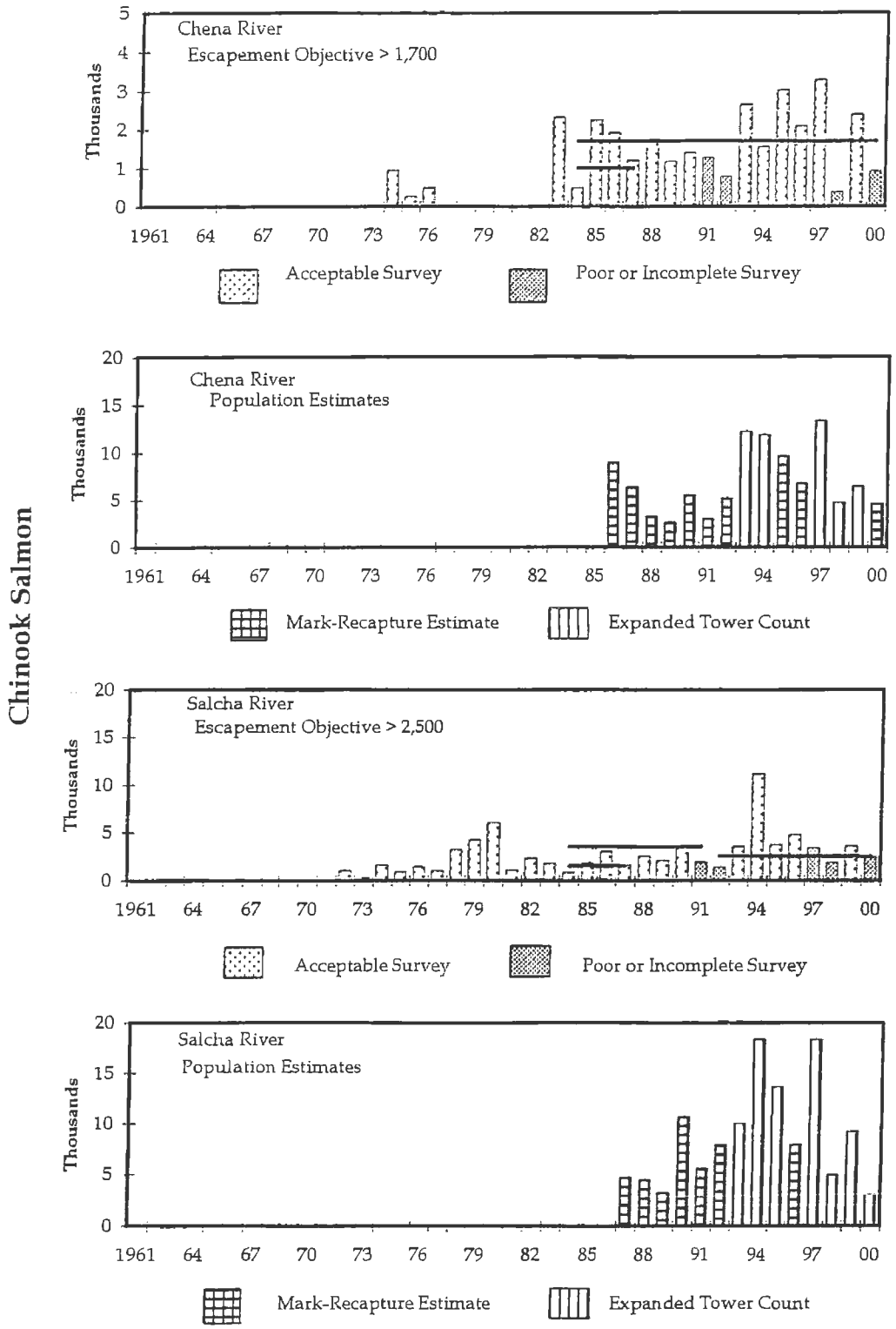




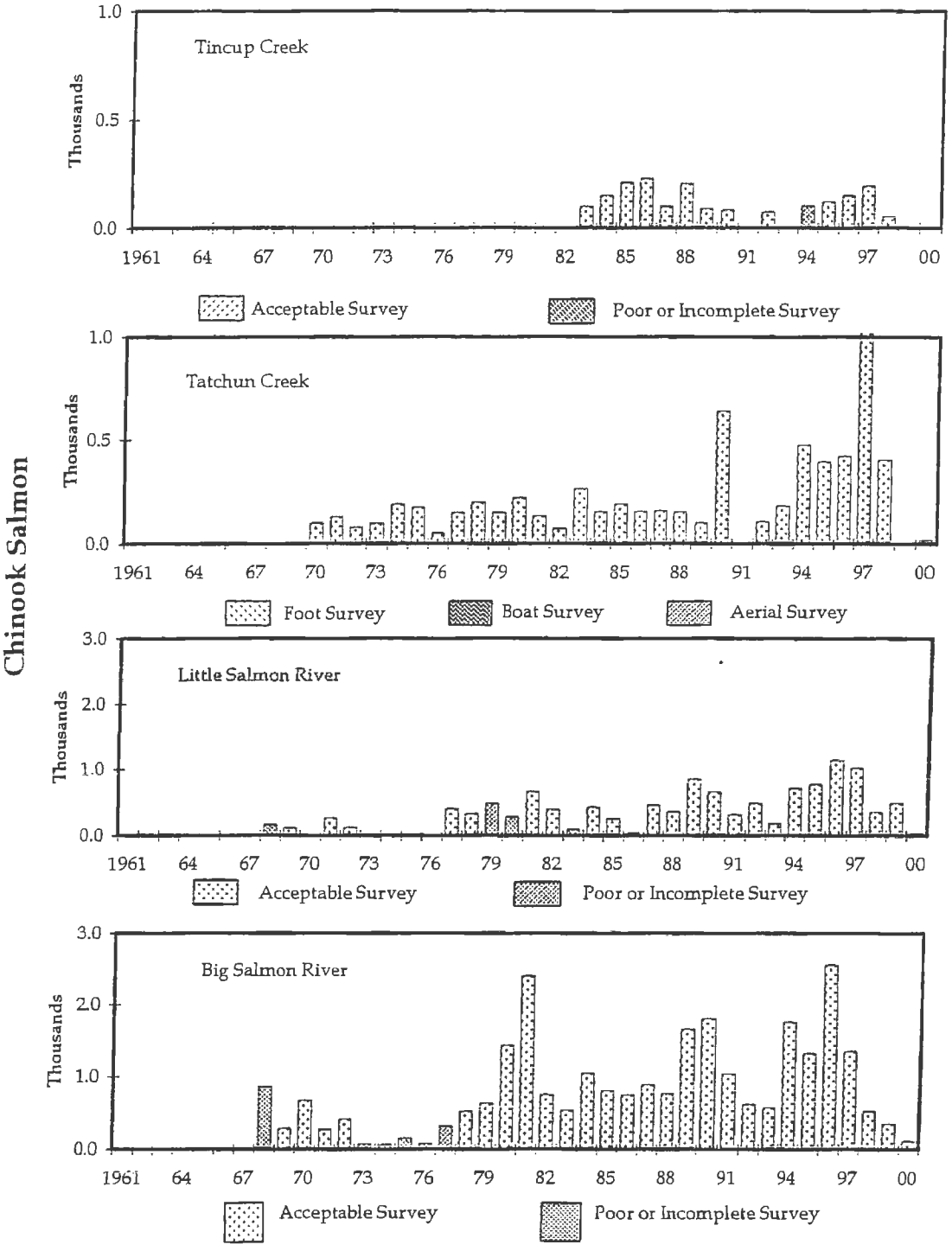
Attachment Figure 10 (page 2 of 4).



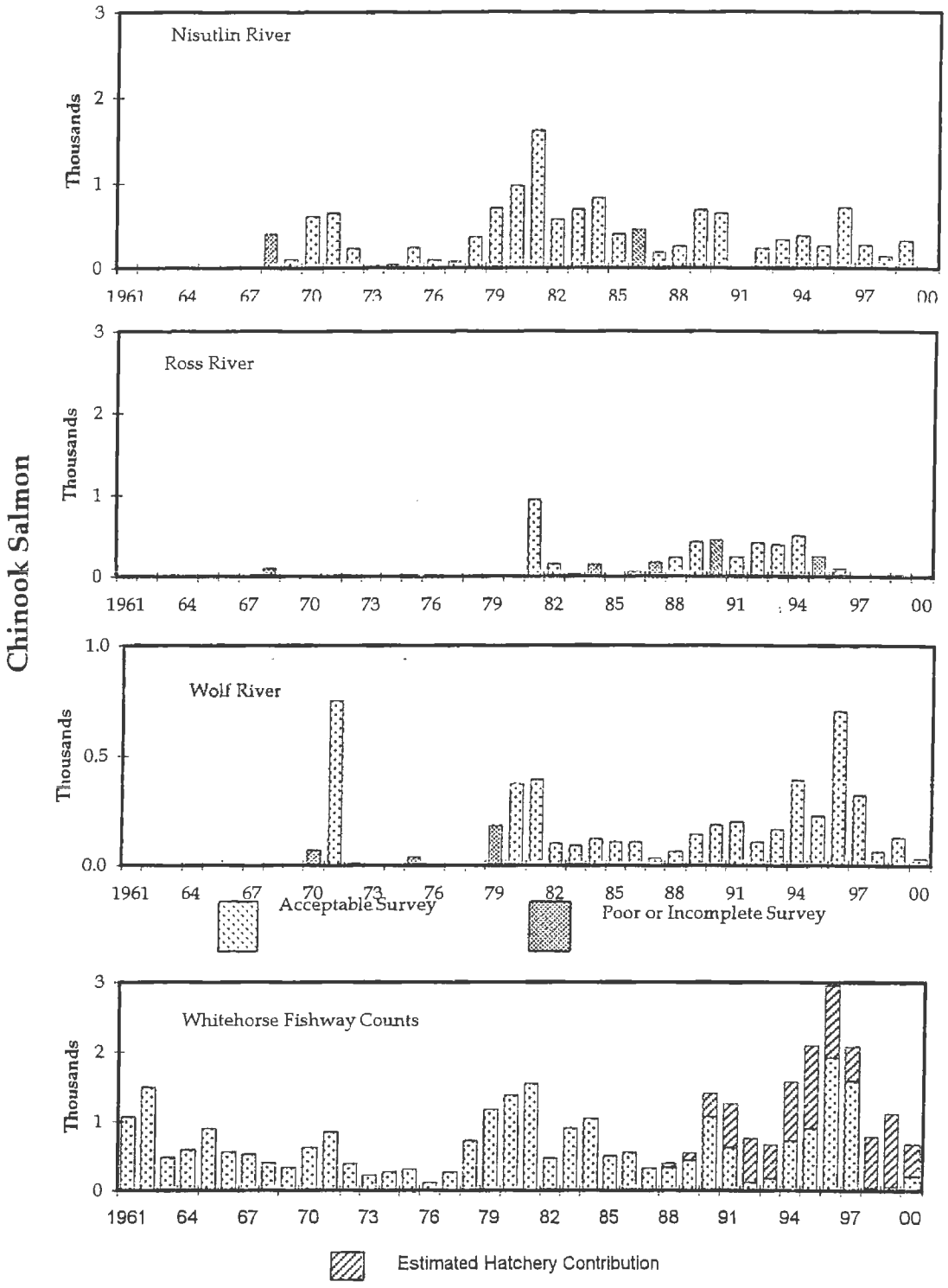
Attachment Figure 10 (page 3 of 4).



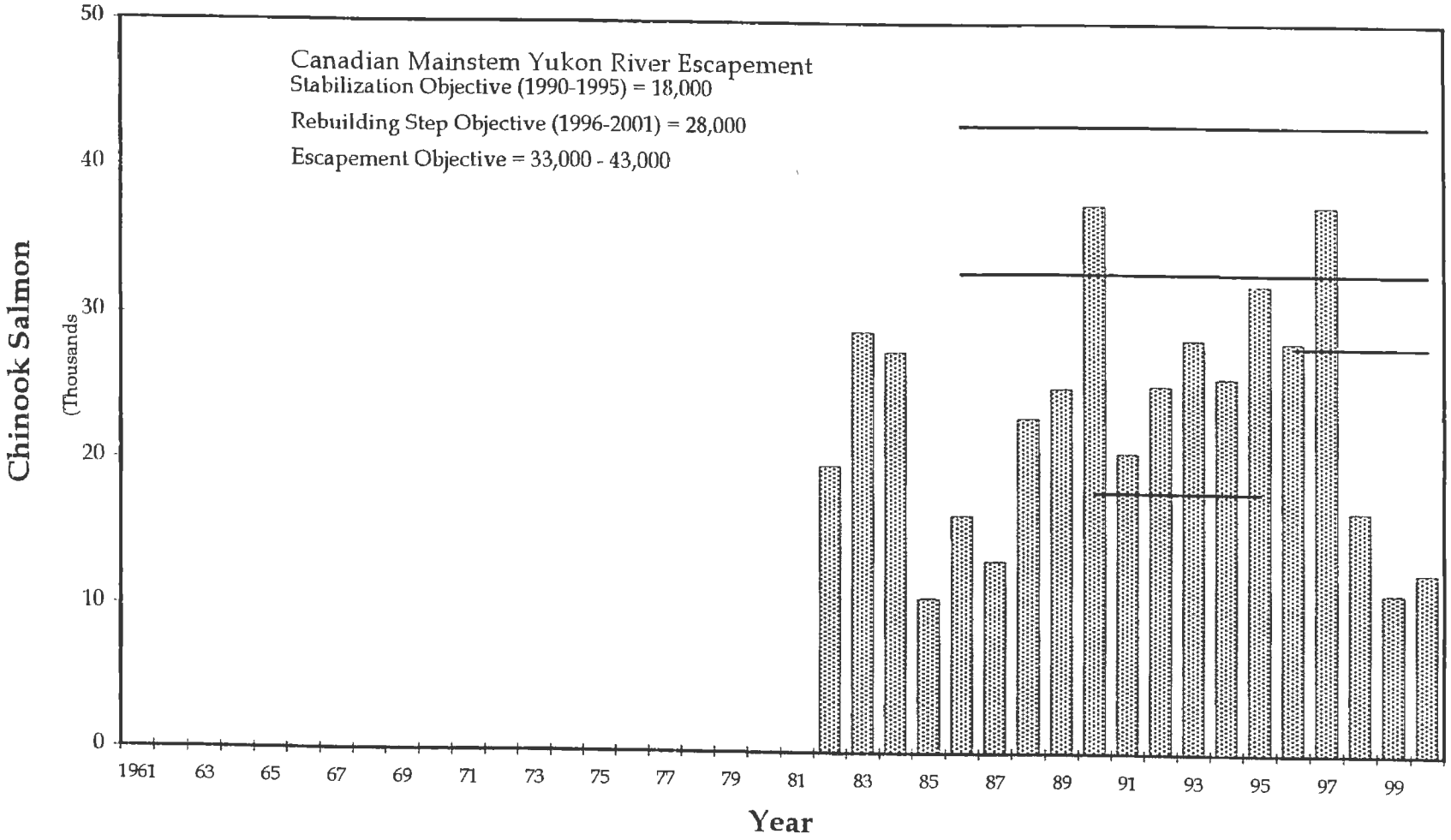
Attachment Figure 10 (page 4 of 4).



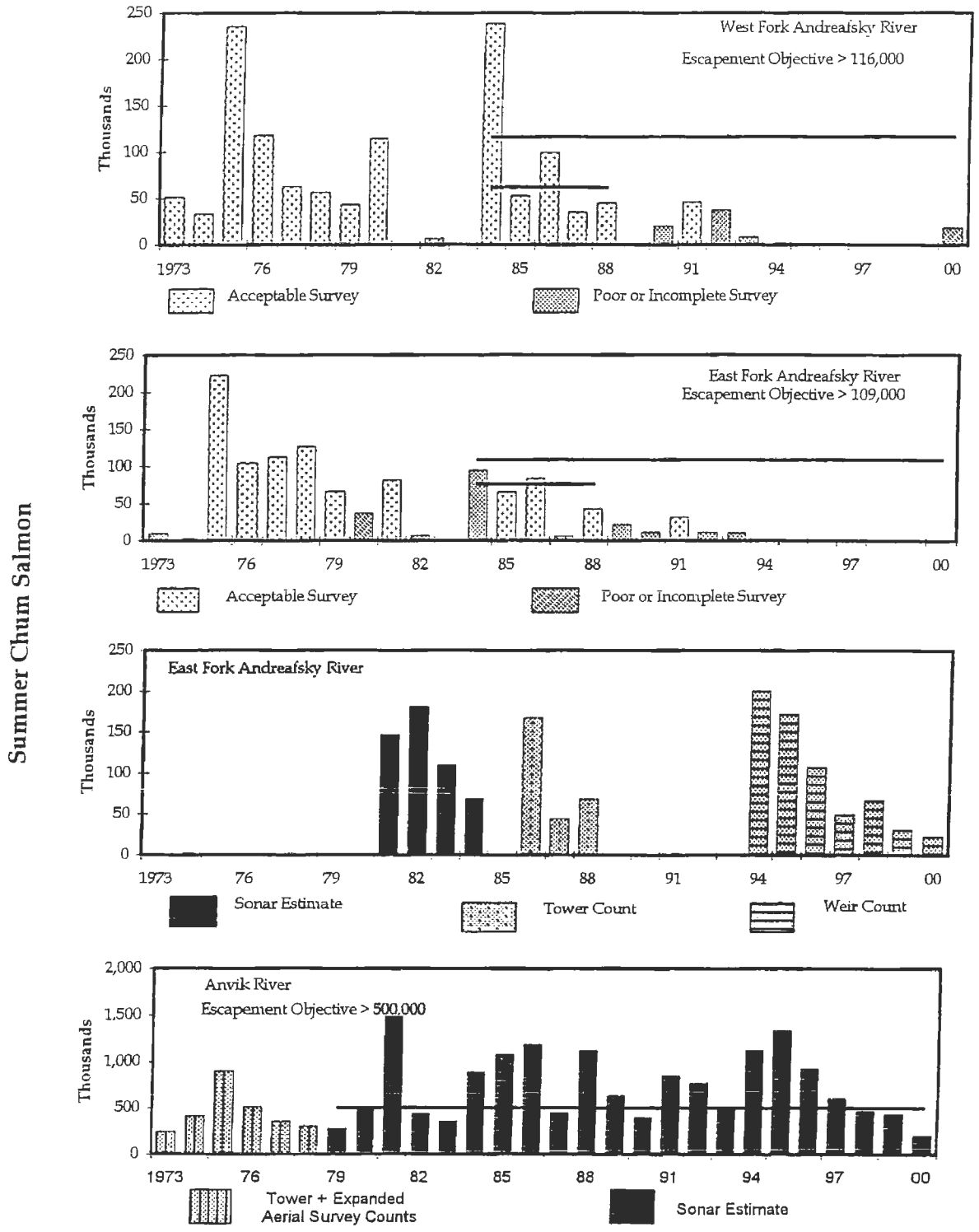
Attachment Figure 11. Chinook salmon escapement data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-1999. Data are aerial survey observations unless noted otherwise. Note the scale of the vertical axis is variable.



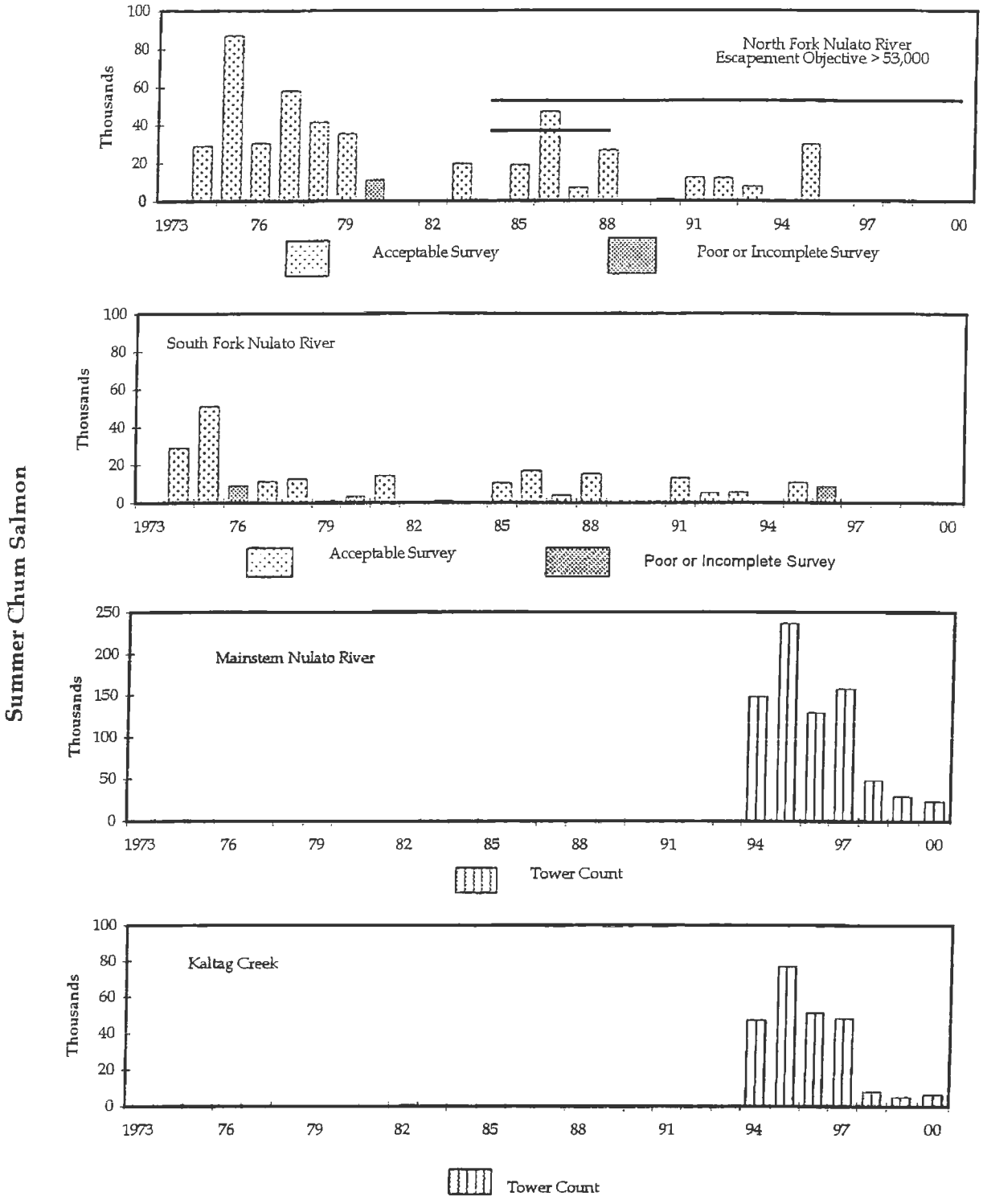
Attachment Figure 11 (page 2 of 2).



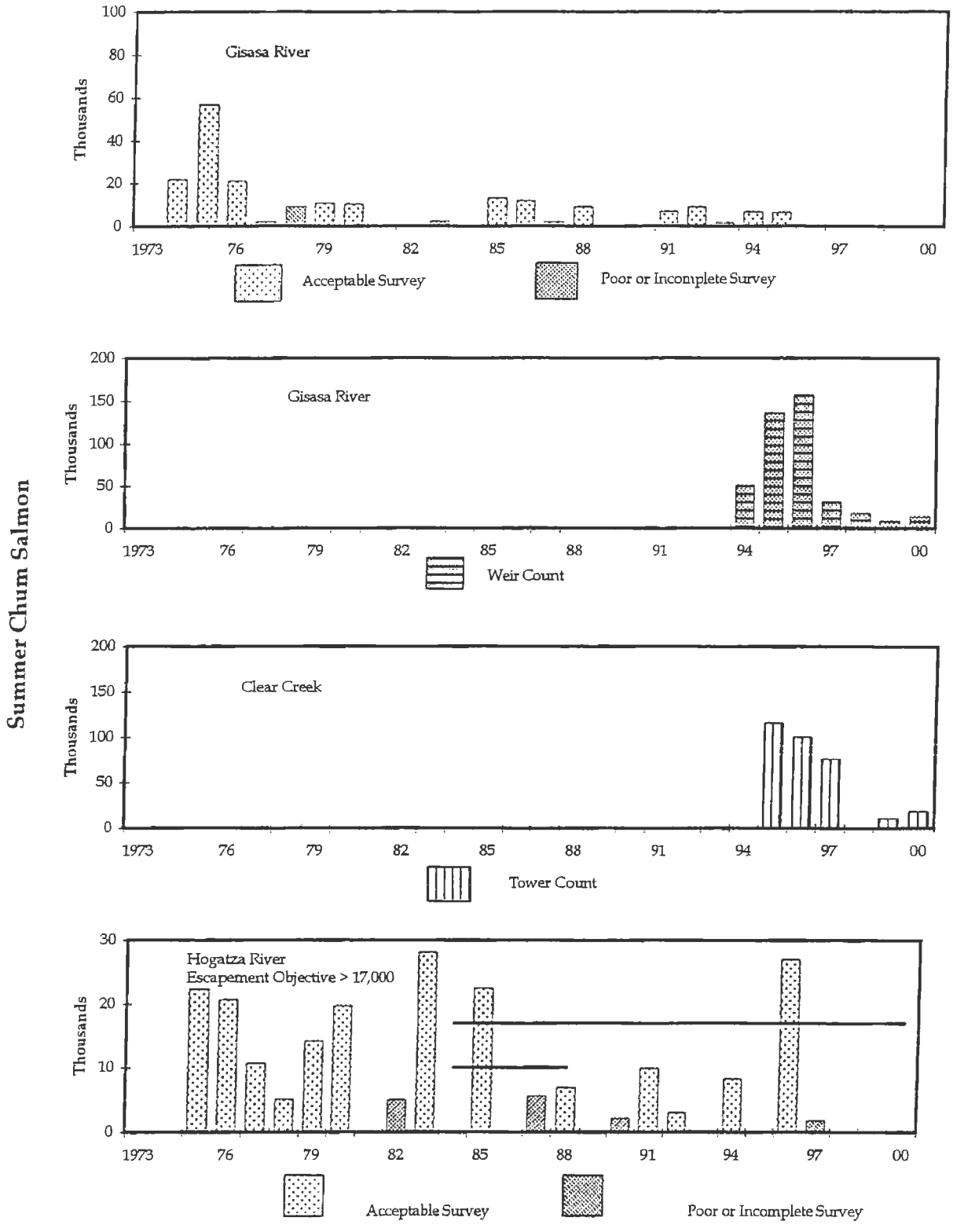
Attachment Figure 12. Estimated total chinook salmon spawning escapement in the Canadian portion of the mainstem Yukon River drainage, 1982-2000. Horizontal lines represent the interim escapement goal range of 33,000-43,000 salmon, the stabilization objective of 18,000 salmon and the rebuilding step objective of 28,000 salmon.



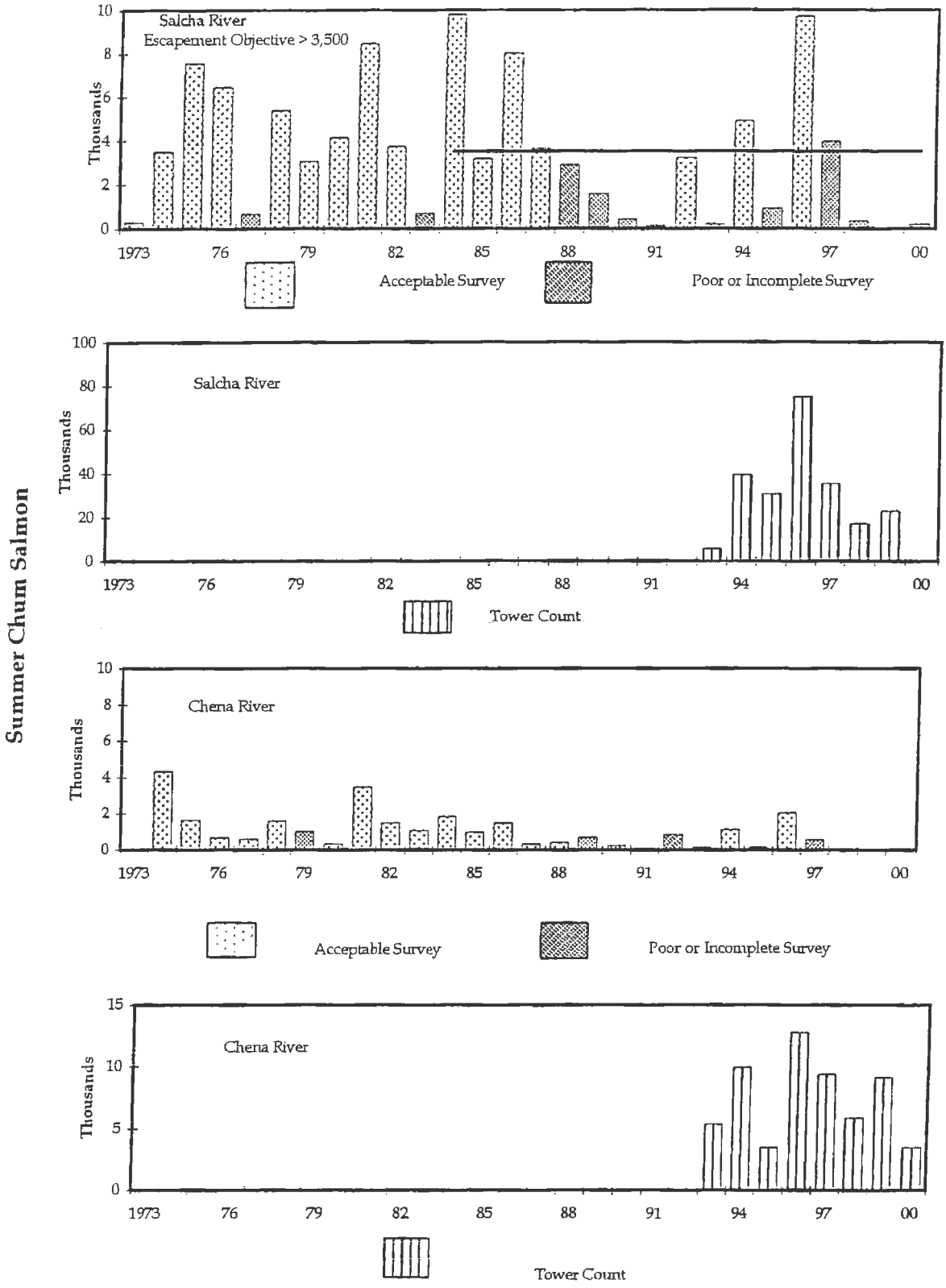
Attachment Figure 13. Summer chum salmon escapement data for selected spawning areas in the Yukon River drainage, 1973-2000. Horizontal lines represent interim escapement goal objectives or ranges. Data are aerial survey observations unless noted otherwise. Note that the scale of the vertical axis is variable.



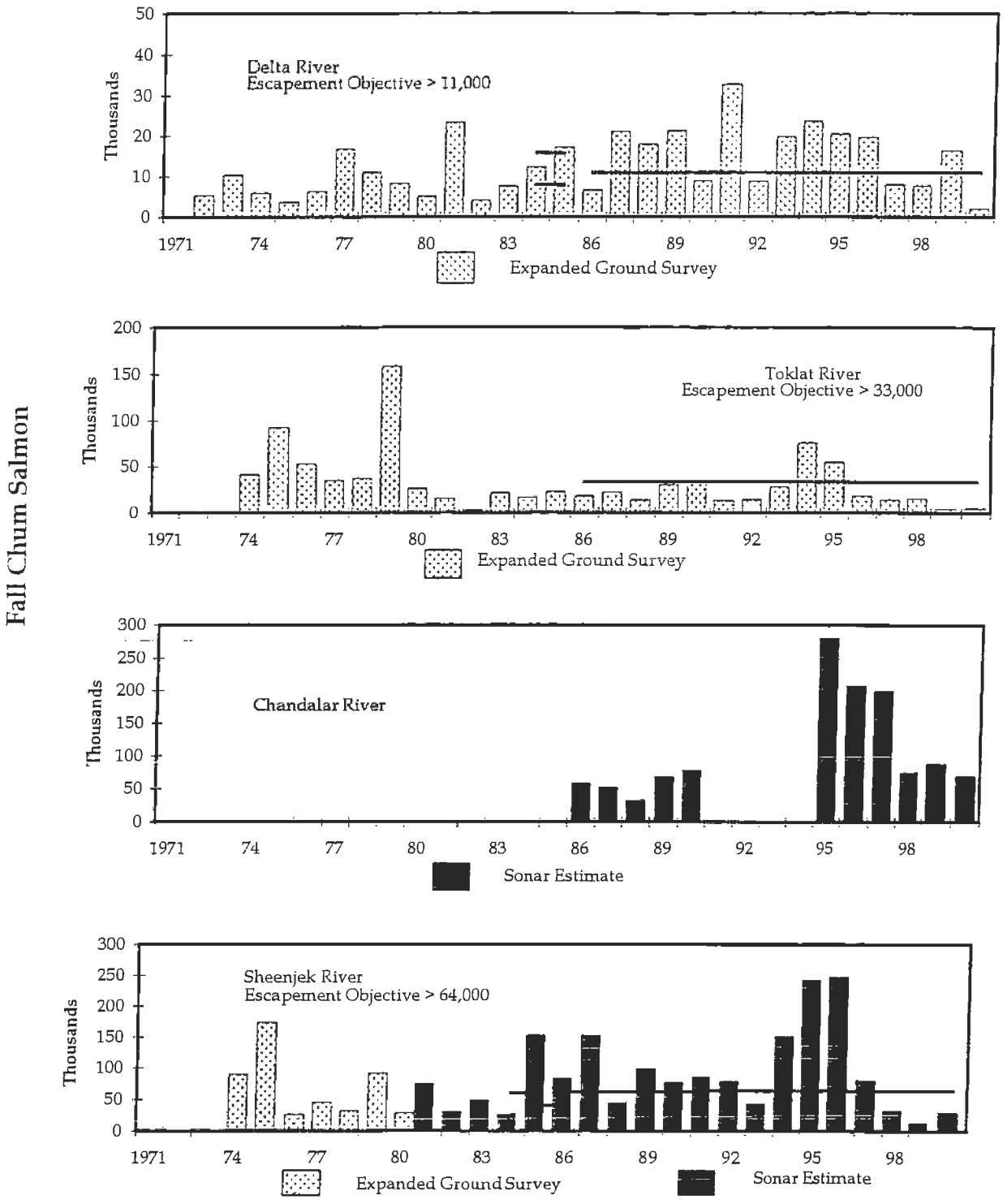
Attachment Figure 13 (page 2 of 4).



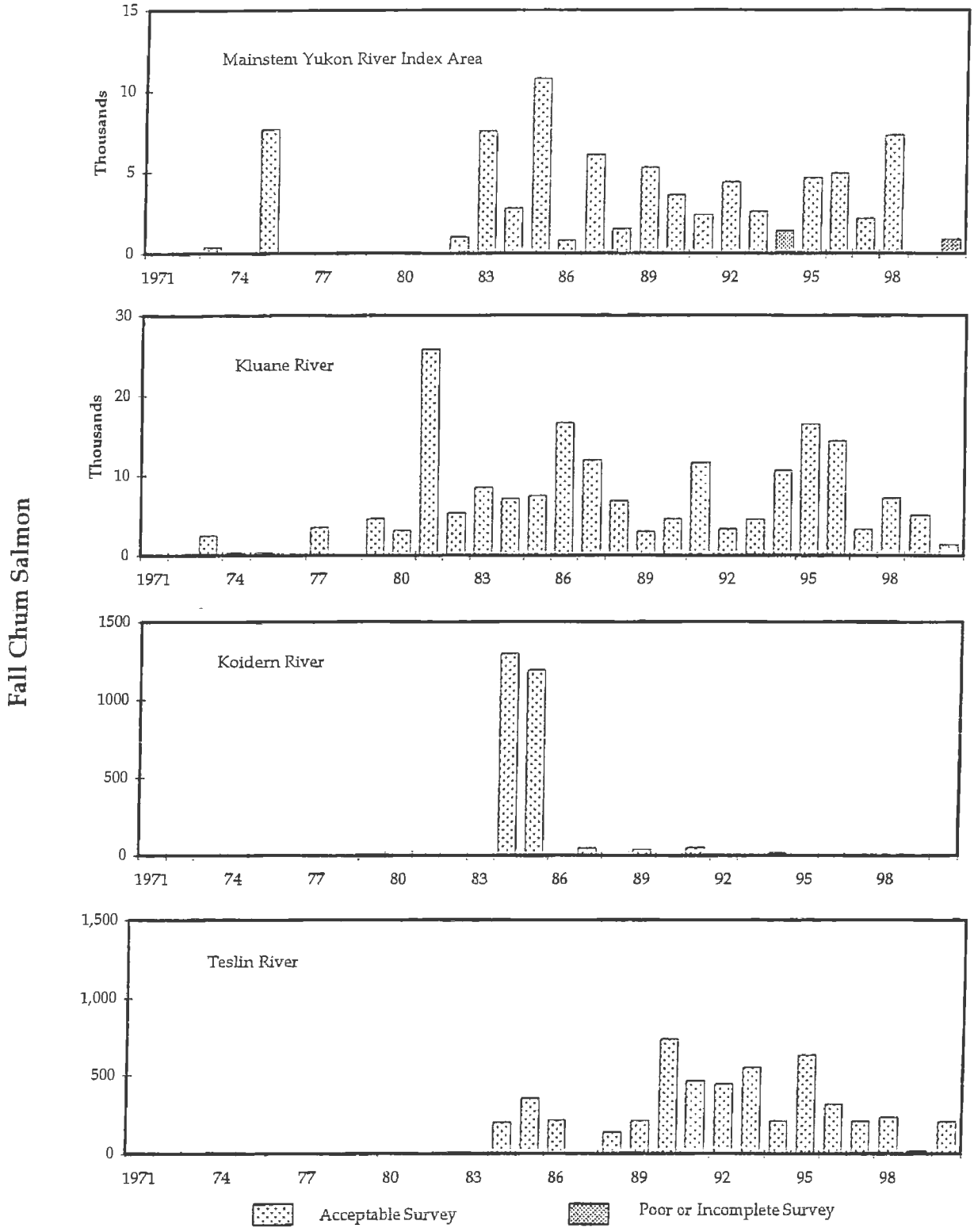
Attachment Figure 13 (page 3 of 4).



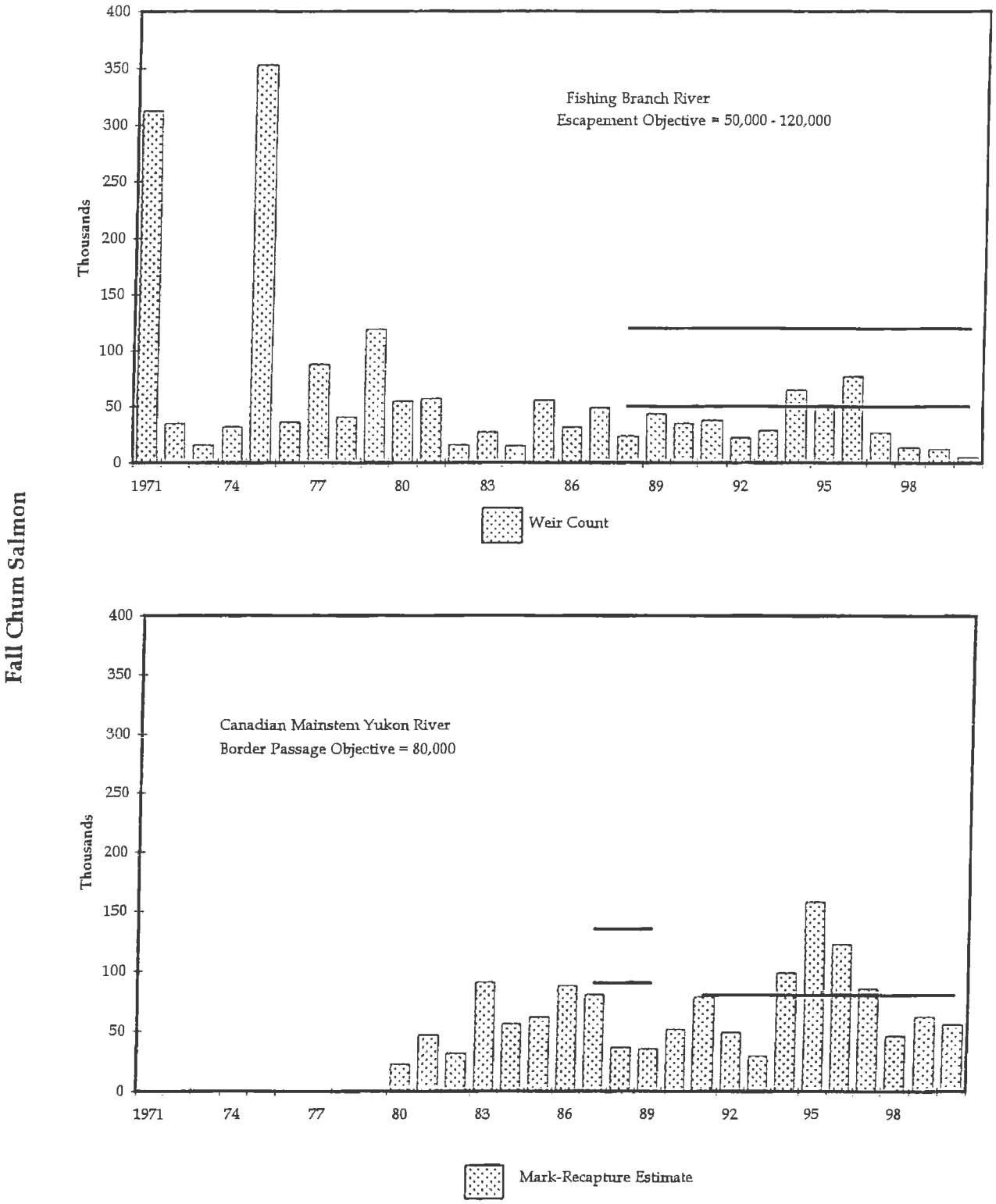
Attachment Figure 13 (page 4 of 4).



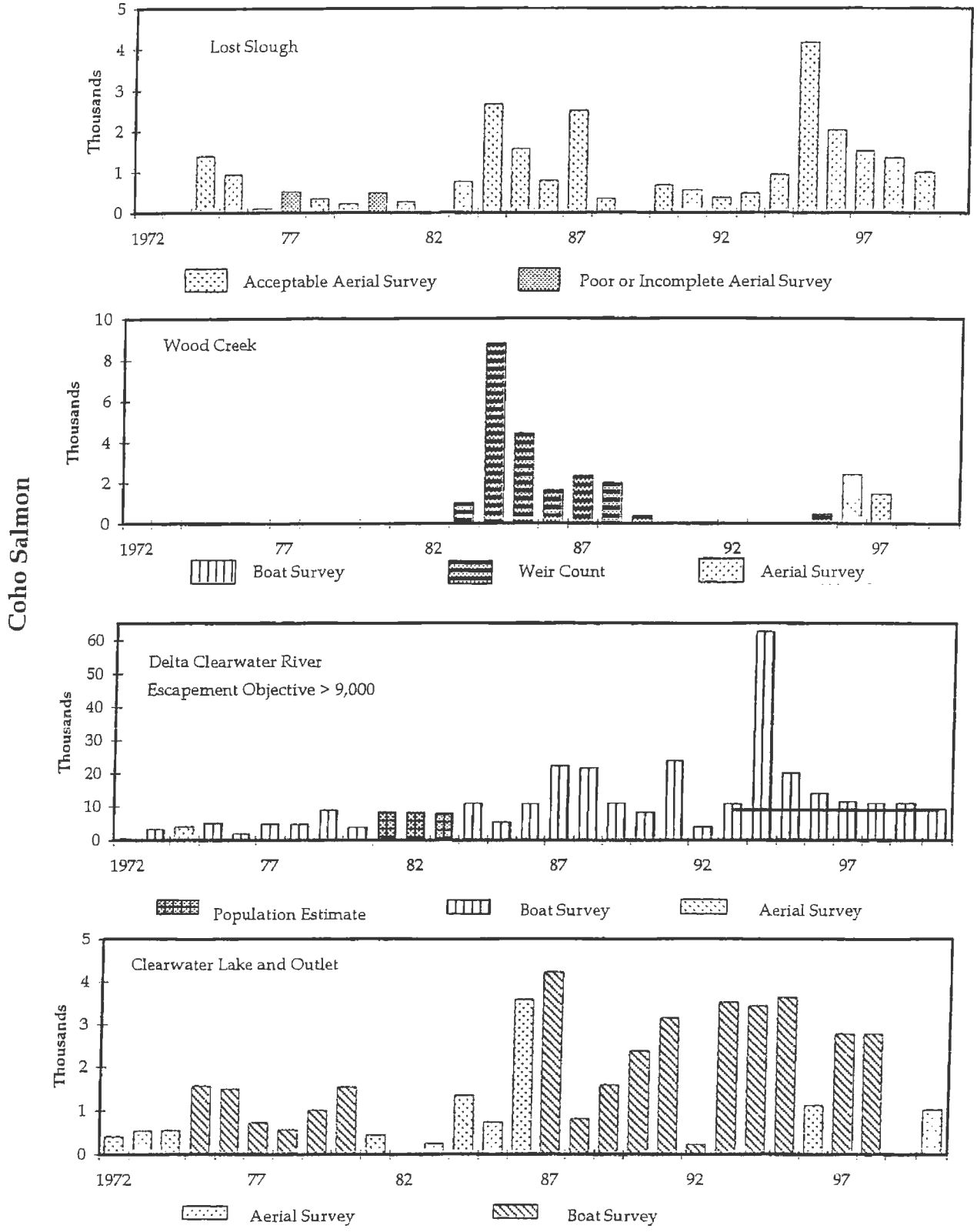
Attachment Figure 14. Fall chum salmon escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1971-2000. Horizontal lines represent interim escapement goal objectives or ranges. Note that the scale of the vertical axis is variable.



Attachment Figure 15. Fall chum aerial survey data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1971-2000. Note that the scale of the vertical axis is variable.



Attachment Figure 16. Fall chum salmon escapement estimates for spawning areas in the Canadian portion of the Yukon River drainage, 1971-2000. Horizontal lines represent interim escapement goal objectives or ranges.



Attachment Figure 17. Coho salmon escapement data for selected spawning areas in the Yukon River drainage, 1972-2000. Horizontal line indicates the interim escapement goal. Note that the scale of the vertical axis is variable.

ATTACHMENT II

MARINE FISHERIES INFORMATION

ATTACHMENT II. MARINE FISHERIES INFORMATION

1.0 INTRODUCTION

Yukon River salmon migrate as juveniles out of the Yukon River and into the Bering Sea. Where they go once they enter the ocean is only partly understood. Evidence from tagging studies and the analysis of scale patterns indicate that these salmon spread throughout the Bering Sea, some move considerably south of the Aleutian Island chain into the Gulf of Alaska and North Pacific Ocean, and some move north into the Chukchi Sea. While in the ocean, they mix with salmon stocks from Asia and elsewhere in North America. Figure 1 shows the general ocean distribution of Asian and North American chinook salmon.

While in the ocean, some of these salmon are caught by commercial fisheries that take place in marine waters. In 1999, marine commercial fisheries with a bycatch that likely included some Yukon River salmon included: (1) the U.S. groundfish trawl fisheries in the Bering Sea-Aleutian Islands area and in the Gulf of Alaska, and (2) the purse seine and gill net salmon fishery in the South Alaska Peninsula ("False Pass") area. Other commercial fisheries which operate in marine waters of the Bering Sea and Gulf of Alaska where Yukon River salmon occur, but which catch few, if any, salmon include: (1) the U.S. longline fisheries for Pacific halibut, Pacific cod, and other groundfish, (2) the U.S. pot fisheries for Pacific cod and other groundfish, and Dungeness, king, and Tanner crab, and (3) the U.S. purse seine and gillnet fisheries for Pacific herring.

Until 1992, five large commercial fisheries in the ocean caught large numbers of salmon, some of which were likely Yukon River salmon. However, under international agreements, those fisheries no longer operate. They were (in order of decreasing salmon catches): (1) the Japanese high-seas mothership and land-based salmon gill net fisheries; (2) the high-seas squid gillnet fisheries in the North Pacific Ocean of Japan, the Republic of Korea, and the Republic of China (Taiwan); (3) the foreign groundfish fisheries of the Bering Sea and Gulf of Alaska, (4) the joint venture groundfish fisheries of the Bering Sea and the Gulf of Alaska, and (5) the groundfish trawl fishery by many nations in the international waters area of the Bering Sea ("the Doughnut Hole").

As has been noted in the past, a small commercial salmon gill net fishery operates in subdistricts at various river mouths in Norton Sound, and is managed by the Alaska Department of Fish and Game and the Alaska Board of Fisheries. A small portion of the chinook and chum salmon caught in the southern subdistricts may be bound for the Yukon River. In 2000, the commercial catch of chinook and chum salmon for all of the Norton Sound subdistricts combined totaled 752 chinook and 6,150 chum salmon. The prior 5-year (1995-1999) average commercial catch was 7,271 chinook and 22,363 chum salmon.

Salmon run failures were evident again in 2000 across a broad region of western Alaska, including the Yukon River in Alaska and Canada. While the causes for the production failures are not known, attention has focused on the marine environment because of the broad scope of the production failures. Likely factors that have received the most attention to date have included the effects of El Nino, ocean and climate regime shifts, and competition relative to ocean carrying capacity.

2.0 BERING SEA AND GULF OF ALASKA GROUNDFISH FISHERY

2.1 History and Management of the Groundfish Fishery

The U.S. groundfish fisheries in the Bering Sea-Aleutian Islands area and in the Gulf of Alaska are managed under the Magnuson-Stevens Fisheries Conservation and Management Act by the North Pacific Fishery Management Council (NPFMC), and are regulated by the National Marine Fisheries Service (NMFS).

In general, the groundfish fisheries of the Gulf of Alaska are managed and regulated separately from those in the Bering Sea-Aleutian Islands area. Both major areas contain a number of smaller regulatory areas, which are numbered. The groundfish fisheries east of 170° west longitude and north of the Alaska Peninsula are considered to be in the Bering Sea-Aleutian Islands Area (Figure 2 and 3). The groundfish fisheries operating in waters south of the Alaska Peninsula and east of 170° west longitude are considered to be in the Gulf of Alaska Area (Figure 4).

The U.S. groundfish fishery off the coast of Alaska expanded rapidly during the last 15 years . In 1977, the year after the Magnuson Act went into effect, the U.S. groundfish harvest off Alaska amounted to only 2,300 metric tons (mt, 1 mt = 2,204.6 pounds), or only 0.2% of the total groundfish harvest off Alaska by all nations. Most of that U.S. catch was Pacific halibut caught with hook-and-line gear.

The Magnuson Act, which claimed exclusive fishery jurisdiction by the United States of waters to a distance 200 nautical miles seaward from the coast, allowed the U.S. to gradually replace the foreign groundfish fisheries by "joint-venture" fisheries, in which U.S. fishermen caught the fish and delivered them at sea to foreign fish processing vessels. The joint-venture fishery, in turn, was replaced by an entirely U.S. fishery. The estimated ex-vessel value of the total Alaskan commercial fisheries from 1982 through 1997 is given in Table 1.

The U.S. groundfish fisheries use basically three types of fishing gear: trawls, hook-and-line (including longline and jig), and pots. In 1998, 1,273 vessels landed groundfish caught off Alaska. Of these, 916 used hook-and-line gear, 262 used trawls and 231 used pots. Table 2 summarizes the number of vessels that landed groundfish by gear type in the two areas from 1992 to 1998. Table 3 summarizes the number of vessels by length within each type of fishing gear from 1992 to 1996.

Many of the North Pacific Councils actions in 1999 were related to pollock. The American Fisheries Act passed by Congress made changes to ownership provisions, pollock allocations, vessel retirement and buyout, co-ops, and sideboards. Another major issue affecting the BSAI and GOA pollock and other trawl fisheries was a NMFS biological opinion that the BSAI and GOA pollock fisheries jeopardized the recovery of Steller sea lions in those areas. In response, the Council took emergency action to prohibit pollock fishing within 10 nautical miles of

numerous rookeries and haulout; reduce the catch of pollock within critical habitat areas; prohibit pollock fishing in the Aleutian Islands area; and spread out effort over time in the Bering Sea and GOA. Management measures were also adopted to reduce the impacts of the BSAI Atka mackerel fishery on Steller sea lions. There will now be two seasons and the amount taken within sea lion critical habitat will be limited. The Western Alaska Community Development Quota (CDQ) Program which has six groups representing the 65 western Alaska communities that are eligible, expanded from pollock only to all federally managed Aleutian Island and Bering Sea groundfish species. Currently, the CDQ program is allocated portions of the groundfish fishery that range from 10% for pollock to 7.5% for most other species. On January 1, 2000, the License Limitation Program (LLP) required that any person who wished to deploy a harvesting vessel in the king and Tanner crab fisheries in the BSAI and in the directed groundfish fisheries (except for IFQ sablefish, and for demersal shelf rockfish east of 140 degrees West longitude) in the GOA or the BSAI must hold a valid groundfish or crab license (as appropriate) issued under the LLP.

2.2 The Observer Program

Under U.S. law and regulations, salmon may not be retained by the U.S. groundfish fishery and must be returned to the sea. The groundfish observer program began in 1977 on foreign groundfish vessels operating within the U.S. Exclusive Economic Zone (200 nautical miles from the U.S. shore). It continued with the joint-venture fishery until its end. Until 1990, however, there was little information on the accidental or incidental catch of salmon by the U.S. groundfish fishery.

In 1990, the United States began a scientific observer program for the U.S. groundfish fishery off the coast of Alaska. In general, a groundfish harvesting or processing vessel must carry a NMFS certified observer on board whenever fishing or fish processing operations are conducted if the operator is required by the NMFS Regional Administrator to do so, and a shoreside groundfish processing plant must have a NMFS certified observer present whenever groundfish is received or processed if the plant is required to do so by the NMFS Regional Administrator.

The amount of observer coverage is usually related to the length of the vessel or the amount of fish processed by a shoreside plant or mothership processing vessel. Groundfish harvesting vessels having a length of 125 feet or more are required to carry observers at all times when they are participating in the fishery. Vessels with lengths between 60 through 124 feet are required to carry observers during 30 percent of their fishing days during trips when they fish more than 3 days. Vessels shorter than 60 feet do not have to carry observers unless required to do so by the Administrator of the NMFS Alaska Region. Mothership or Shoreside processing plants processing 1,000 metric tons (mt) or more per month are required to have 100 percent observer coverage, those processing between 500 and 1,000 mt per month are required to have 30 percent coverage, and those processing less than 500 mt per month need no observer coverage unless it was required specifically by the NMFS Regional Administrator.

Observers must be trained and certified. To be certified as an observer by the National Marine Fisheries Service, an applicant must have a bachelor's degree in fisheries, wildlife biology, or a related field of biology or natural resource management. Observers must be capable of performing strenuous physical labor, and working independently without direct supervision under stressful conditions. Because observers are not employees of the Federal Government but instead hired by certified contractors, applicants must apply directly to a certified contractor. If hired, the contractor will arrange for them to attend a 3-week observer training course in Seattle or Anchorage. Upon successful completion of the course, they will be certified as a groundfish observer.

In addition to the observer coverage, all groundfish harvesters over 60 feet and processors must maintain and submit logbooks on their groundfish harvests and their catch of the prohibited species, including crabs, halibut, herring, and salmon

2.3 Estimated Catch of Salmon in the Groundfish Fisheries

NMFS estimates the number of salmon caught in the groundfish fisheries from the observer reports and the weight of groundfish caught. Observers are instructed to collect random samples of each net haul before it has been sorted, and to gather information from each salmon in a haul. Observers record the species caught and the number of each species, determine the sex of dead or dying salmon, record the weight and length of each salmon, collect scales, and check for missing adipose fins. If a salmon is missing its adipose fin, the observer removes and preserves the snout, which may contain a coded-wire tag.

NMFS scientists then use the number of salmon of each species caught in each haul sampled, the weight of groundfish caught in each haul sampled, and the total weight of groundfish harvested during the sampling period to estimate the total number of salmon of each species caught by the entire groundfish fleet. Table 4 presents a summary of the estimated numbers of chinook and other salmon caught by the U.S. groundfish fisheries from 1990 through October 1999. Table 4 indicates that the number of salmon caught by the groundfish fisheries varies considerably by species of salmon, by year, and between the Bering Sea-Aleutian Islands Area and the Gulf of Alaska. For the most part, chinook and chum salmon make up most of the catch, with coho a distant third, and sockeye and pink salmon minor components.

The catch of salmon in the Bering Sea-Aleutian Islands (BSAI) area in 2000 as of September 30 was 61,674 (7,477 chinook and 54,198 other salmon) and in the Gulf of Alaska the salmon catch was 37,461 (25,503 chinook and 10,958 other salmon). Certain areas in the BSAI have been declared salmon savings area for both chum and chinook salmon (Figures 2 and 3) based on high rates of catch in the past.[1] After the 1998 season, because of the concerns regarding chinook salmon conservation in western Alaska and in response to a proposal submitted by BSFA, the NPFMC lowered the allowable bycatch of chinook salmon in the BSAI trawl fishery.

[1] Information on past and present bycatch of salmon in the BSAI and GOA groundfish fisheries can be obtained from the NMFS Alaska Region web page at www.fakr.noaa.gov.

One of the big unanswered questions is what stocks of salmon are being caught by the U.S. groundfish fisheries and how many of each stock. Some information comes from coded-wire tagged salmon recovered by observers. But that information only shows that certain coded-wire tagged stocks are caught, it says nothing specific about the many stocks without coded-wire tags. Canada has coded-wire tagged upper Yukon River chinook salmon for a number of years. To date, five have been recovered in the Bering Sea groundfish fisheries (Table 5, Figure 5).

Currently, NMFS and ADF&G are looking at genetic stock identification (GSI) techniques to shed more light on the question. More of the stocks in the U.S. and Canada are being defined. particularly chinook and chum salmon, and more GSI information is becoming available on the stocks in Japan and Russia, as well. NMFS observers have collected GSI samples from chum salmon caught by the trawls in the BSAI, ADF&G has sampled the chum catch in the June False Pass fishery, and the Japanese in cooperation with NMFS collected chum salmon samples from the Okhosk Sea and various areas in the North Pacific and Bering Sea. Regional origins as determined by GSI from these three studies are shown in Table 6.

3.0 SOUTH ALASKA PENINSULA ("FALSE PASS") JUNE FISHERY

A purse seine and gill net fishery targeting Bristol Bay sockeye salmon, with an incidental catch of chum salmon bound for Bristol Bay, the Arctic-Yukon-Kuskokwim region, and Asia, operates during the month of June in the South Alaska Peninsula area in the vicinity of Unimak Island and the Shumagin Islands. This fishery, known as the "False Pass" fishery, has operated since 1911, and is managed by the Alaska Department of Fish and Game and the Alaska Board of Fisheries. For management and statistical purposes, the Alaska Department of Fish and Game includes the False Pass area in Statistical Area M.

The 2000 management plan allocated 8.3% of the preseason forecasted Bristol Bay sockeye salmon harvest to the False Pass June fishery, which calculated to a guideline harvest level of 2,013,000 sockeye salmon. The Alaska Board of Fisheries has made changes to the fishery management plan for the False Pass June fishery on a periodic basis. The most recent changes to the fishery management plan were made during the January 1998 meeting of the Board. These changes included lowering of the chum salmon cap from 700,000 fish to a floating cap that can range from 350,000 to 650,000 chum depending on an Arctic-Yukon-Kuskokwim (AYK) harvest projection based on the previous year's harvest of summer chum salmon in AYK. Management concerns for specific chum salmon stocks in AYK are also a factor in determining the cap for a given year. The chum salmon cap for 2000 was 350,000 to 400,000 fish.

Total catch in the False Pass June fishery in 2000 was 1,272,000 sockeye and 248,000 chum salmon. The sockeye salmon catch was 63% of the guideline harvest level, while the chum salmon catch was 29% below the low end of the cap. Table 7 summarizes historical sockeye and chum salmon catches in this fishery since 1980.

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Table 1. Ex-vessel value of the catch in the commercial fisheries off Alaska by species group, 1982-97, (value in $ millions and percentage of total).

Year	Shellfish	Salmon	Herring	Halibut	Groundfish	Total
1982	216.5	310.7	19.9	25.7	211.0	783.8
1983	147.7	320.6	29.8	43.0	188.0	729.1
1984	103.4	343.0	20.4	19.6	239.4	725.8
1985	106.9	389.6	36.9	37.5	260.1	831.0
1986	183.0	404.1	38.4	70.1	268.6	964.2
1987	215.2	473.0	41.7	76.3	336.7	1142.9
1988	235.6	744.9	56.0	66.1	444.6	1547.1
1989	279.2	506.7	18.7	84.4	425.3	1314.3
1990	355.1	546.7	24.0	86.9	474.9	1487.6
1991	301.1	300.1	28.6	91.6	548.3	1269.7
1992	335.1	544.5	27.0	48.0	656.9	1611.5
1993	328.5	391.1	14.1	53.6	425.8	1213.1
1994	321.2	424.4	21.6	84.7	465.2	1317.1
1995	282.9	495.9	39.1	59.5	593.7	1471.1
1996	175.2	346.5	44.8	74.2	541.9	1182.6
1997	172.1	247.8	15.9	106.5	583.1	1125.4
			Percentage of Total			
1982	27.6	39.6	2.5	3.3	26.9	100.0
1983	20.3	44.0	4.1	5.9	25.8	100.0
1984	14.2	47.3	2.8	2.7	33.0	100.0
1985	12.9	46.9	4.4	4.5	31.3	100.0
1986	19.0	41.9	4.0	7.3	27.9	100.0
1987	18.8	41.4	3.6	6.7	29.5	100.0
1988	15.2	48.2	3.6	4.3	28.7	100.0
1989	21.2	38.6	1.4	6.4	32.4	100.0
1990	23.9	36.8	1.6	5.8	31.9	100.0
1991	23.7	23.6	2.3	7.2	43.2	100.0
1992	20.8	33.8	1.7	3.0	40.7	100.0
1993	27.1	32.2	1.2	4.4	35.1	100.0
1994	24.4	32.2	1.7	6.4	35.3	100.0
1995	19.2	33.7	2.7	4.0	40.4	100.0
1996	14.8	29.4	3.8	6.3	45.7	100.0
1997	15.3	22.0	1.4	9.5	51.8	100.0

Note: The value added by at-sea processing is not included in these estimates of ex-vessel value. Includes Joint venture and foreign groundfish catch.

Source: National Marine Fisheries Service, Alaska Region; National Marine Fisheries Service Office of the Pacific Marine Fisheries Commission, Pacific Fisheries Information Network, 7600 Sand Point Way N.E., BIN C15700, Seattle, WA 98115- 0070.

Table 2. Number and total registered net tons of vessels that caught groundfish off Alaska by area and gear, 1992-1998.

	Gulf of Alaska		Bering Sea and Aleutians		All Alaska	
Gear/Year	Number of vessels	Registered net tons	Number of vessels	Registered net tons	Number of vessels	Registered net tons
Hook and line						
1992	1,811	54,698	163	22,076	1,848	64,050
1993	1,515	48,571	115	19,086	1,537	53,068
1994	1,386	51,264	138	17,822	1,410	54,422
1995	1,107	39,203	175	18,395	1,159	45,317
1996	1,017	39,658	158	16,902	1,066	45,762
1997	975	32,455	137	15,616	1,004	38,116
1998	876	31,402	115	16,032	916	38,582
Pot						
1992	226	11,822	73	13,584	277	22,598
1993	103	4,867	21	2,956	118	7,282
1994	110	5,767	40	5,253	136	9,787
1995	188	13,939	126	16,457	263	24,419
1996	146	9,121	103	14,579	217	20,151
1997	147	8,917	84	13,369	202	19,056
1998	178	10,653	79	12,033	231	19348
Trawl						
1992	233	48,547	201	87,268	300	93,405
1993	193	37,107	182	80,259	282	87,786
1994	187	34,247	164	77,830	256	84,565
1995	220	49,909	184	80,551	264	86,024
1996	199	40,124	192	77,789	277	83,374
1997	206	37,452	168	72,324	262	78,725
1998	198	32,077	166	68,074	262	74,448
All gear						
1992	2,118	104,833	408	115,193	2,243	162,352
1993	1,718	84,334	309	98,995	1,837	139,097
1994	1,571	84,051	335	98,381	1,683	139,075
1995	1,396	95,026	464	112,253	1,545	144,446
1996	1,269	82,935	439	107,061	1,448	140,338
1997	1,245	73,808	381	98,655	1,374	127,919
1998	1,140	67,491	337	92,419	1,273	121,953

Note: Includes only vessels fishing Federal TACs. Registered net tons totals exclude mainly smaller vessels for which data were unavailable. The percent of Vessels missing are: 1992 - 8%, 1993 - 7%, 1994 - 6%, 1995 - 5%, and 1996 - 7%.

Source: Blend estimates, fish tickets, Norpac data, federal permit file, CFEC vessel data, National Marine Fisheries Service, 7600 Sand Point Way N.E., BIN C15700, Seattle, WA

Table 3. Numbers of vessels that caught groundfish off Alaska by area, vessel length class (feet), catcher type, and gear, 1992-96.

	Gulf of Alaska				Bering Sea and Aleutian				All Alaska			
	Vessel length class				Vessel length class				Vessel length class			
No. of vessels	<60	60-124	125-230	>230	<60	60-124	125-230	>230	<60	60-124	125-230	>230
Catcher vessels (excluding catcher processors)												
Fixed												
1992	1649	209	7	0	68	75	11	0	1660	239	15	0
1993	1367	148	0	0	36	36	3	0	1375	163	3	0
1994	1455	190	2	0	66	48	5	0	1470	212	6	0
1995	1216	199	9	0	91	136	19	0	1251	255	23	0
1996	1116	179	7	0	64	125	17	0	1143	222	18	0
Trawl												
1992	63	109	15	0	6	97	29	1	66	131	29	1
1993	64	86	9	0	10	87	22	0	71	126	22	0
1994	62	82	18	0	3	77	26	0	62	110	26	0
1995	58	108	20	0	3	95	22	1	59	122	24	1
1996	63	82	17	0	6	91	31	0	66	115	32	0
All Gear												
1992	1684	297	22	0	74	167	40	1	1695	344	44	1
1993	1409	218	9	0	45	123	25	0	1423	273	25	0
1994	1483	247	20	0	69	125	31	0	1498	297	32	0
1995	1241	286	29	0	94	225	40	1	1275	349	46	1
1996	1147	245	24	0	69	216	47	0	1176	320	49	0
Catcher-processors												
Fixed												
1992	3	24	23	0	0	28	46	0	3	30	48	0
1993	4	27	23	0	1	31	31	0	4	32	31	0
1994	3	30	21	0	2	33	26	0	3	35	26	0
1995	5	18	16	0	2	28	27	0	5	29	27	0
1996	4	13	11	0	1	21	32	0	4	21	32	0
Trawl												
1992	0	8	28	6	0	12	40	19	0	13	40	19
1993	0	8	22	5	0	9	37	21	0	9	38	21
1994	0	5	17	4	0	5	34	21	0	6	34	21
1995	0	8	20	8	0	10	35	22	0	10	36	22
1996	0	7	28	2	0	7	34	21	0	8	34	21
All Gear												
1992	3	31	49	6	0	33	79	19	3	36	80	19
1993	4	34	43	5	1	39	62	21	4	40	62	21
1994	3	35	38	4	2	38	58	21	3	41	58	21
1995	5	26	36	8	2	36	60	22	5	37	61	22
1996	4	19	39	2	1	27	65	21	4	27	65	21
All catchers												
All Gear												
1992	1684	323	70	6	74	198	110	20	1695	373	114	20
1993	1410	247	52	5	45	157	85	21	1424	302	85	21
1994	1484	271	58	4	71	156	86	21	1499	321	87	21
1995	1243	307	63	8	95	248	96	22	1277	371	101	22
1996	1149	258	63	2	70	232	108	21	1178	334	110	21

Table 4. Estimated number of chinook and other salmon caught by the groundfish fisheries off the coast of Alaska, 1990 through October 1999 (Berger 1999). Data for 1999 through 10/16/99.

Year	Chinook	Chum	Coho	Sockeye	Pink	Total
BSAI						
1990	14,085	16,202	153	30	31	30,501
1991	48,873	29,706	396	79	79	79,133
1992	41,955	40,090	1,266	14	80	83,405
1993	45,964	242,895	321	22	8	289,210
1994	44,380	95,978	231	20	202	140,811
1995	23,079	20,901	858	0	21	44,859
1996	63,205	77,771	218	5	1	141,200
1997	50,218	67,349	114	3	69	117,753
1998	58,966	----------	69,237	----------		128,203
1999	17,115	----------	64,468	----------		81,583
2000	7,477	----------	54,198	----------		61,675
GOA						
1990	16,913	2,541	1,482	85	64	21,085
1991	38,894	13,713	1,129	51	57	53,844
1992	20,462	17,727	86	33	0	38,308
1993	24,465	55,268	306	15	799	80,853
1994	13,973	40,033	46	103	331	54,486
1995	14,647	64,067	668	41	16	79,439
1996	15,761	3,969	194	2	11	19,937
1997	15,119	3,349	41	7	23	18,539
1998	16,941	----------	13,539	----------		30,480
1999	28,169	----------	7,240	----------		32,183
2000	26,503	----------	10,958	----------		37,461

Table 5. Coded-wire tagged Yukon River chinook salmon recoveries in the U.S. groundfish fisheries.

Brood Year	Tag Number	Date Tagged	Date Recovered	Location	
				Lat.	Long.
1988	026006	Jun-89	25-Mar-92	56 44	173 15
1990	180322	Jun-91	14-Mar-94	60 06	178 58
1991	180830	Jun-92	24-Feb-95	55 19	164 43
1992	181215	Jun-93	06-Dec-94	56 52	171 18
1992	181216	Jun-93	02-Jun-97	59 29	167 49

Table 6. Regional stock composition estimates (%) of chum salmon from four studies using genetic stock identification.

	Region of Origin				
Area Sampled	Asia	Western Alaska Summer Run	Fall Yukon	Alaska Peninsula	PWS/SE Alaska/ BC/Washington
Okhotsk Sea[1]					
1993	90.6	7.9	0.0	1.0	0.5
Western North Pacific[1]					
1993	86.7	8.2	0.0	5.1	0.1
1996	93.7	2.3	0.0	2.5	1.5
1997	77.9	11.1	0.0	11.1	0.0
1998	82.1	7.6	0.0	5.4	4.9
(Sample seized from F/V *Ying Fa* 1999)[5]	87.8	2.0	0.0	8.1	2.1
(Sample seized from F/V *Arctic Wind* 2000)[6]	77.0	11.0	0.0	6.0	5.0
Central North Pacific[1]					
1996	78.9	12.9	0.0	6.6	1.6
Eastern North Pacific[1,4]					
(Gulf of Alaska)					
1996	15.7	14.8	0.0	13.1	56.6
(Central Gulf of Alaska					
1998 (49-52°N, 145°W)	10.9	15.1	0.4	28.8	44.9
1998 (53-56°N, 145°W)	15.1	13.2	0.7	21.6	49.4
1998 (49-56°N, 145°W)	11.2	14.5	0.4	24.7	49.6
(Western Gulf of Alaska)					
1998 (45-50°N, 165°W	77.8	13.0	0.3	3.9	5.0
Off Vancouver Island[1]					
1995	18.9	0.7	0.0	21.4	59.1
Central Bering Sea[1]					
1996	79.6	4.3	0.0	15.5	0.7
Bering Sea [2]					
(Trawl Bycatch)					
1994	46.9	22.3	3.6	3.0	24.2
1995	36.7	31.4	6.3	1.7	23.9
Area M (False Pass)					
Shumagin[3]					
1994	34.0	44.0	3.0	8.0	9.0
1995	25.0	52.0	1.0	8.0	12.0
1996	34.0	36.0	2.0	19.0	10.0
South Unimak[3]					
1993	22.0	59.0	1.0	7.0	11.0
1994	27.0	57.0	2.0	9.0	6.0
1995	26.0	65.0	1.0	3.0	7.0
1996	23.0	40.0	5.0	17.0	14.0

Sources: [1] Urawa et al. 1998 [2] Wilmot et al. 1997 [3] Seeb et al. 1997 [4] Urawa et al. 1999 [5]Wilmot et al. 1999. [6] Wilmot et al., 2000

Table 7. Commercial harvest of sockeye and chum salmon in the "False Pass" June Fishery, 1980 – 1999. Source of data: ADF&G.

Year	Sockeye	Chum
1980	3,206,000	509,000
1981	1,821,000	564,000
1982	2,119,000	1,095,000
1983	1,964,000	786,000
1984	1,388,000	337,000
1985	1,791,000	434,000
1986	471,000	352,000
1987	794,000	443,000
1988	757,000	527,000
1989	1,745,000	455,000
1990	1,346,000	519,000
1991	1,549,000	773,000
1992	2,458,000	426,000
1993	2,974,000	532,000
1994	1,461,000	582,000
1995	2,105,000	537,000
1996	1,029,000	360,000
1997	1,628,000	322,000
1998	1,288,000	246,000
1999	1,375,000	245,000
2000	1,272,000	248,000

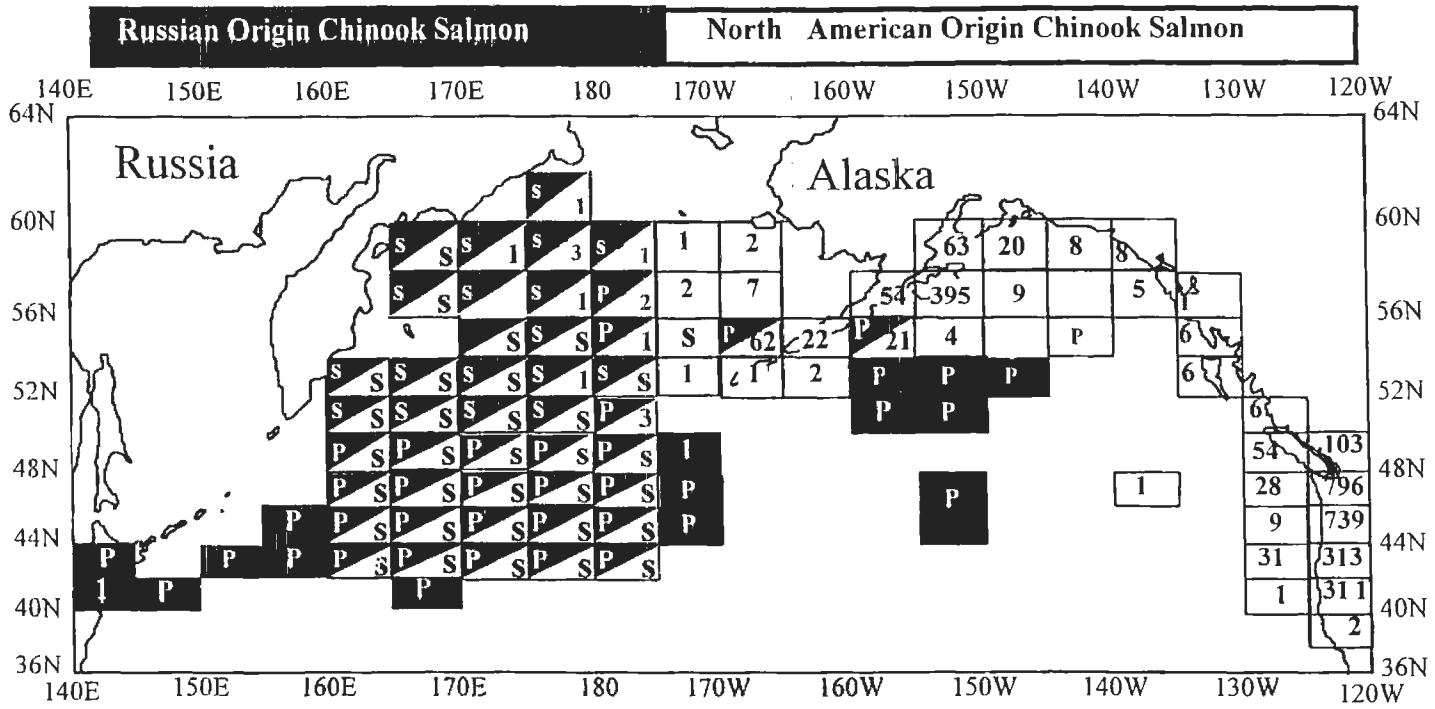

Figure 1. Ocean distribution of Russian (black areas) and North American (white areas) chinook salmon shown by International North Pacific Fisheries Commission (INPFC) 2°-latitude by 5° longitude statistical areas. If tagging experiments prove occurrence, the number of recoveries is shown. The high-seas salmon tag (1953-1997) and coded-wire tag (1983-1997) recovery databases are archived at the FRI. If there is not information from tagging, then a *P* means occurrence is hypothesized from detection of *Myxobolus* spp. parasite "tags", and an *S* means a statistically significant estimate for the stock group was obtained in NMFS and FRI scale-pattern analyses. Scale pattern estimates stratified by INPFC statistical subareas are applied to all 2°-latitude by 5°-longitude strata within that subarea.

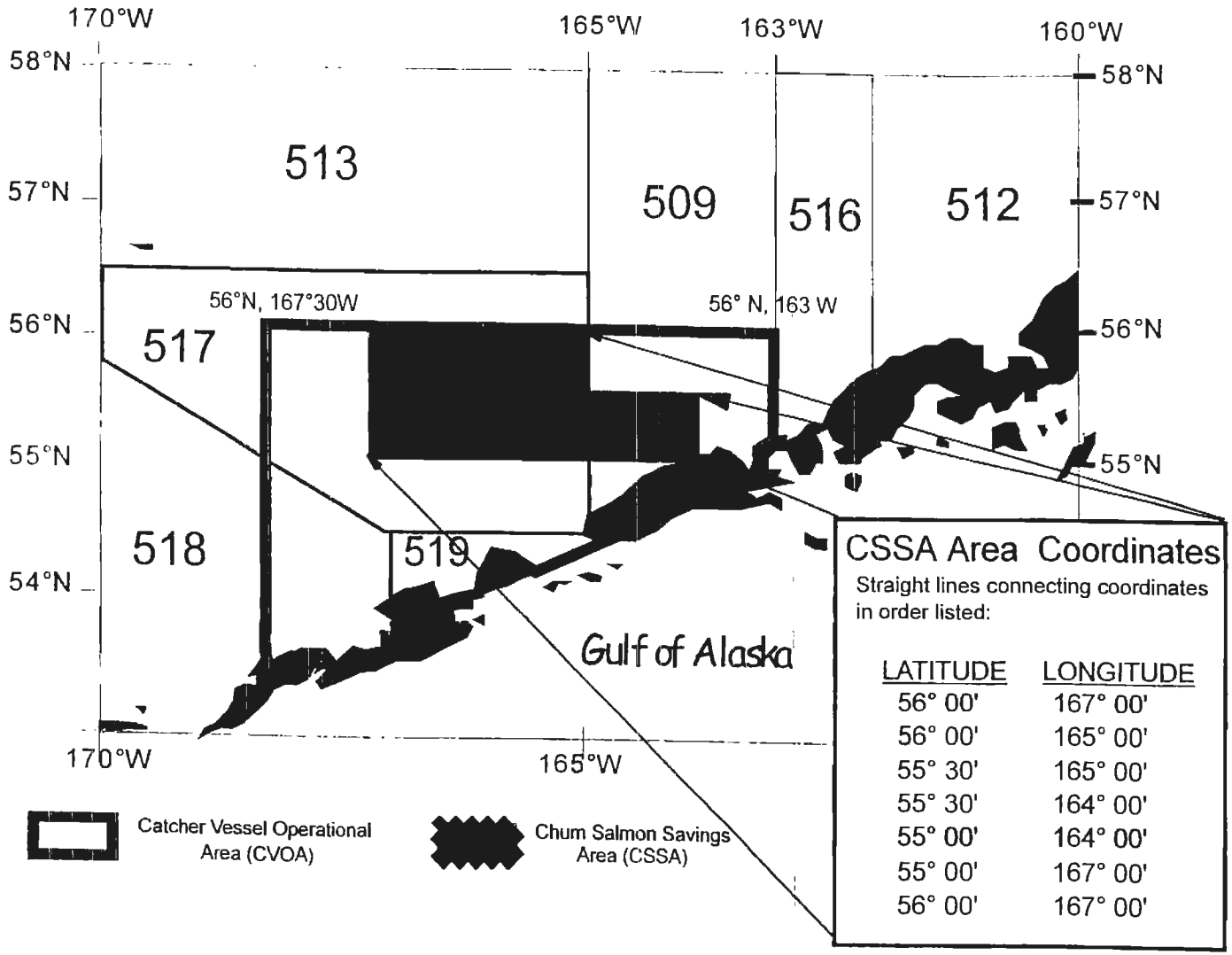

Figure 2. Statistical reporting areas and chum salmon savings area for the U. S. groundfish fisheries in the Bering Sea.

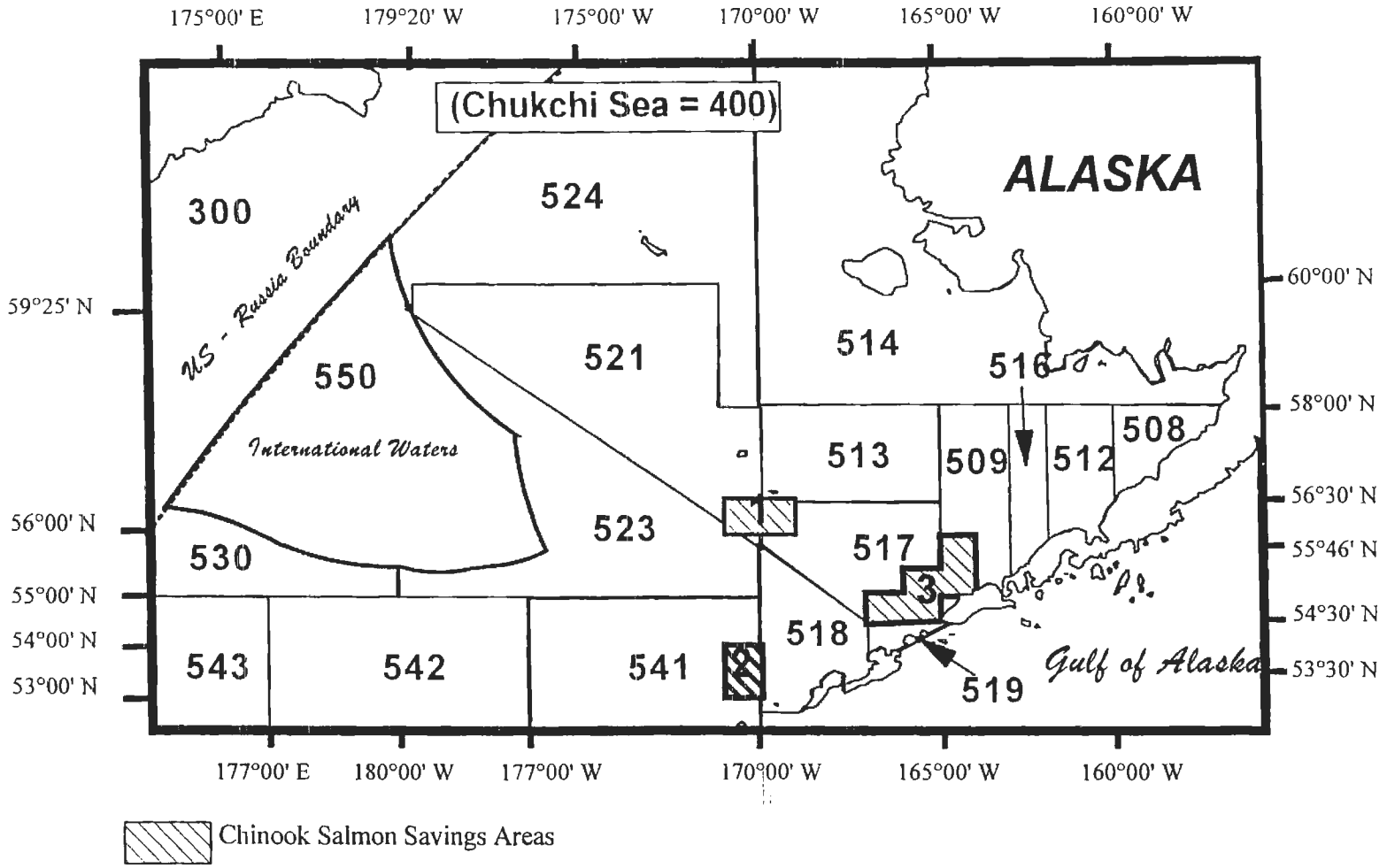

Figure 3. Statistical reporting areas and chinook salmon saving areas for the U. S. groundfish fisheries in the Bering Sea.

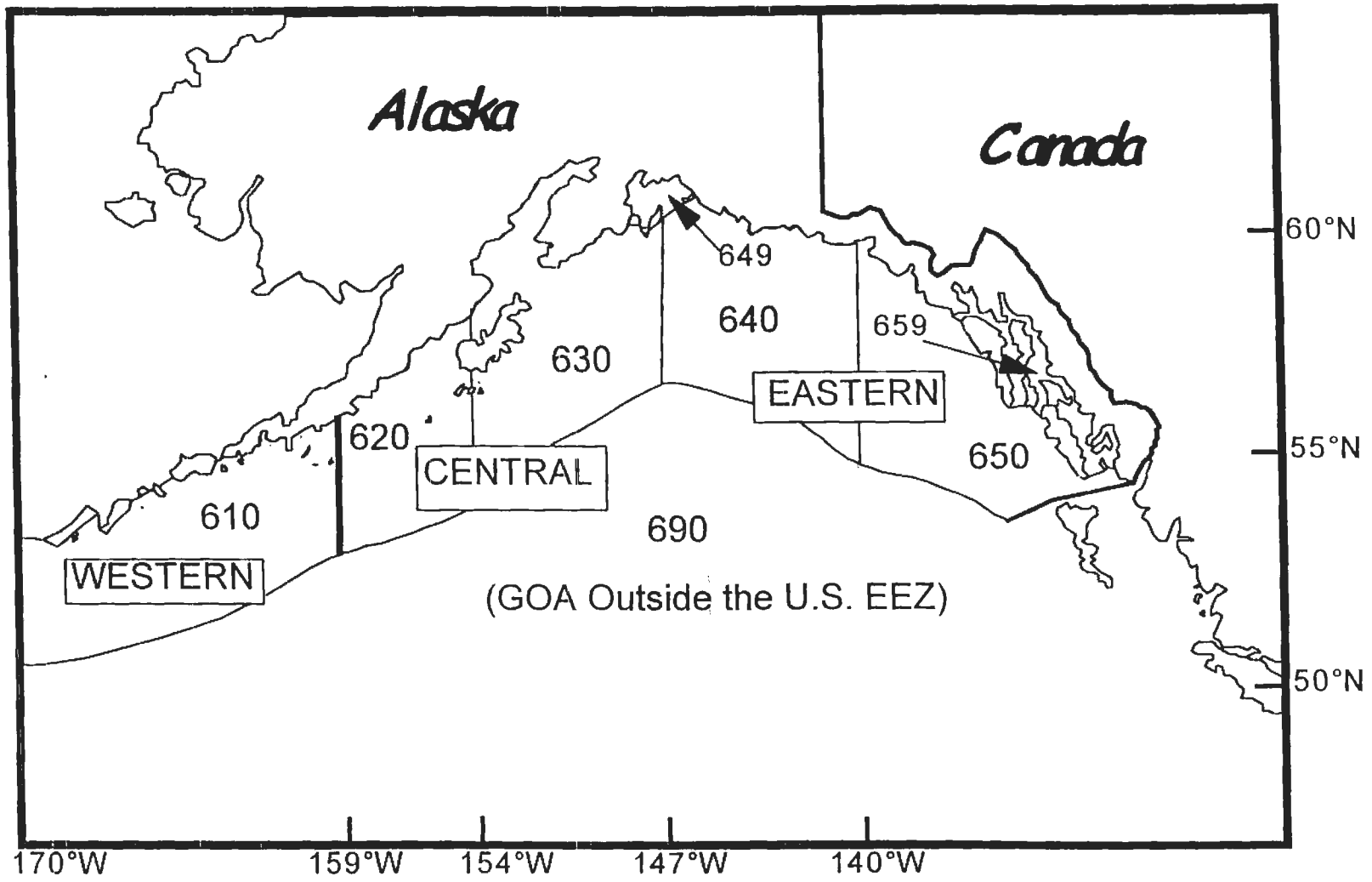

Figure 4. Statistical reporting areas for the U.S. groundfish fisheries in the Gulf of Alaska (GOA).

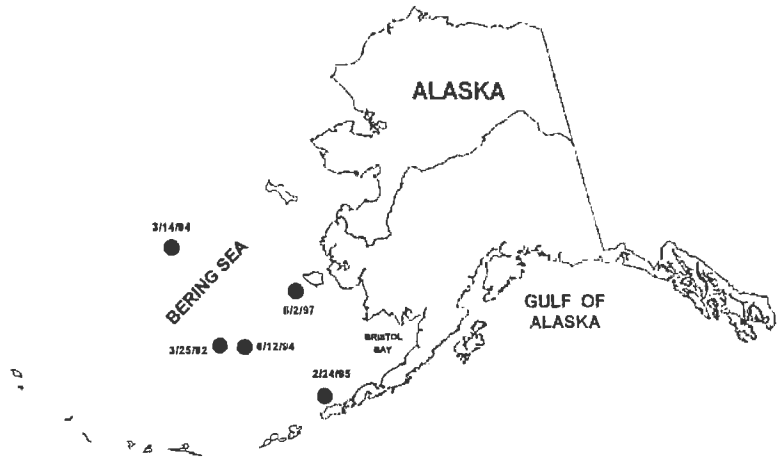

Figure 5. Locations and dates of recoveries of coded-wire tagged Yukon River chinook salmon.